START 3

Superfund Technical Assessment and Response Team 3 – Region 8

United States
Environmental Protection Agency
Contract No. EP-W-05-050

PRELIMINARY ASSESSMENT

SMURFIT-STONE MILL
Missoula, Missoula County, Montana

TDD No. 1105-06

September 14, 2011

URS
OPERATING SERVICES, INC.

In association with:
Garry Struthers Associates, Inc.
LT Environmental, Inc.
TechLaw, Inc.
Tetra Tech EMI
TN & Associates. Inc.

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September 14, 2011

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SUBJECT: **START 3, EPA Region 8, Contract No. EP-W-05-050, TDD No. 1105-06 Preliminary Assessment Report, Smurfit-Stone Mill, Missoula, Missoula County, Montana**

Dear Rob:

Attached is one copy of the Final Preliminary Assessment Report for the Smurfit-Stone Mill site near Missoula, Missoula County, Montana

This document is submitted for your review andapprovaL

If you have any questions, please call me at 303291-8212.

Sincerely,

URS OPERATING SERVICES, INC.

Jeff Miller
Project Manager

cc: Charles W. Baker/UOS (w/o attachment)
File/UOS

PRELIMINARY ASSESSMENT

Smurfit-Stone Mill
Missoula, Missoula County, Montana
MTN000802850

EPA Contract No. EP-W-05-050
TDD No. 1105-06

Prepared By:
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Project Manager

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PRELIMINARY ASSESSMENT

Smurfit-Stone Mill
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1.0 INTRODUCTION

This Preliminary Assessment (PA) of the Smurfit-Stone Mill site (CERCLIS ID# MTN000802850) near Missoula, Missoula County, Montana, has been prepared to satisfy the requirements of Technical Direction Document (TDD) No. 1105-06 issued to URS Operating Services, Inc. (UOS) by the Region 8 office of the U.S. Environmental Protection Agency (EPA) under Superfund Technical Assessment and Response Team 3 (START) contract # EP-W-05-050. Site reconnaissance was conducted by UOS personnel on June 22, 2011 in the company of Robert Parker of the EPA. This PA report is the result of observations made during the site reconnaissance and information obtained from historical records; federal, state, and local agencies; and personal interviews. This PA report has been prepared in accordance with "Guidance for Performing Preliminary Assessments under CERCLA" (EPA 1991).

2.0 OBJECTIVES

The objectives of a PA are to gather data and desktop information and evaluate potential sources, pathways, and targets to identify data gaps, to determine if a site requires sampling and, if so, appropriate sampling locations, matrices, and analytes.

Specifically, the objectives of this PA are to:

- Review historical data regarding site use and any investigative activities that have been performed at and near the site;
- Determine likely contaminant characteristics and quantify waste sources;
- Determine receptor targets and applicable pathways;
- Assess potential routes for contaminant migration;
- Identify targets potentially at risk from contaminant migration, specifically surface water users, wetlands, game fish populations, and groundwater users; and
- Determine the potential impacts to public health and the environment from the identified sources.

3.0 SITE DESCRIPTION

3.1 SITE LOCATION AND DESCRIPTION

The Smurfit-Stone Mill was a large integrated pulp and paper mill that was in operation from late 1957 through early 2010 (Photos 1, 2, 38 in Appendix D). The former mill is located 11 miles northwest of the City of Missoula, in Missoula County, Montana and covers approximately 3,200 acres (Figure 1). The mill is located approximately 3 miles south of the town of Frenchtown and, therefore, has often been referred to as the Frenchtown Mill. The facility address is 14377 Pulp Mill Road, Missoula, and the coordinates of the main mill facility are 46° 57′ 50.12″ north latitude and -114° 11′ 58.15″ west longitude.

The mill site is located in the northeastern portion of the U.S. Geological Survey (USGS) Primrose Quadrangle Map (USGS 1999). For this PA, the site boundary is defined by the outside perimeter of the land parcels that constitute the mill property. The legal description of these parcels is provided in Appendix A, and the site boundary is shown in Figures 1 and 2. The western boundary of the site is the Clark Fork River, with the site having approximately 4 miles of river frontage (Photos 1, 6, 13, 14).

Under the Hazard Ranking System, the target distance limit of the site is defined as a 4-mile radius surrounding the outside perimeter of the mill property, and the Clark Fork River to a distance 15 miles downstream of the mill site (Figure 1). This target distance limit includes creeks draining into the Clark Fork River (Deep, Albert, O'Keefe, Mill, Sixmile, and Ninemile Creeks), as well as the Frenchtown Ponds State Park and portions of the Lolo National Forest. The site lies within the Montana Audubon Clark Fork River – Grass Valley Important Bird Area (Montana Audubon 2009).

The mill site lies within the Clark Fork River valley and is generally flat, with an elevation range from approximately 3,070 feet near the mill facility to approximately 3,040 feet at the Clark Fork River in the northwest corner of the site. Elevations within the 4-mile radius range from approximately 3,015 feet within the Clark Fork River valley to the northwest, to nearly 5,000 feet in the mountains to both the east and west.

The core industrial footprint of the mill site covers approximately 100 acres. Over 900 acres of the site consist of a series of unlined ponds used to store both treated and untreated wastewater effluent from the mill, as well as primary sludge recovered from untreated wastewater. Some ponds initially used to store wastewater were subsequently drained and used for the landfilling of various solid wastes produced at the mill. Approximately half of the ponds currently contain freshwater emergent wetlands. Much of the remaining acreage of the site (approximately 2,000 acres) is used for agricultural purposes, with over 1,200 acres of grasslands for cattle grazing and over 600 acres leased for alfalfa and grain crops (Montana County Rural Initiatives 2010).

3.2 SITE HISTORY

The site began operation as a pulp mill in the fall of 1957. Later expansions and improvements allowed the facility to produce paper, primarily rolls of kraft linerboard that is used in the production of cormgated containers (i.e., the outside layers of cardboard boxes). Linerboard produced at the mill was shipped to box plants where it was used to make a variety of cormgated containers (Smurfit-Stone undated). The mill ceased operations in January 2010.

A timeline of the mill's history, with an emphasis on wastewater discharge information, is provided below (Montana Department of Health and Environmental Sciences [MDHES] 1974, Nielsen 1987, EPA 1999, Smurfit-Stone 2004):

- 1956: Waldorf Paper Products Co. of St. Paul, Minnesota announces it will start constmction of a $6 million pulp mill northwest of Missoula. Groundbreaking occurs in November 1956.
- 1957: Pulp mill begins operation in November with 78 employees and a production capacity of 250 tons per day (tpd) of kraft pulp. No wastewater treatment is initially provided at the mill.
- 1958: First wastewater storage ponds constmcted in August following complaints of fish kills, foam, and discoloration in the Clark Fork River. Allowable discharges to river are negotiated with authorities to occur only during high flow periods (March through June). Remainder of discharge is through evaporation and infiltration through bottom of unlined storage ponds during the storage period of roughly July through February.
- 1960: Mill name becomes Waldorf-Hoemer when Hoemer increases its share to 50 percent. First paper machine and bleaching operation installed in $6 million expansion. Production increases to 450 tpd of linerboard and 150 tpd of bleached pulp.
- 1962: Montana Board of Health negotiates first discharge conditions with mill for spring discharge season.
- 1966: Mill name becomes Hoemer Waldorf Corporation when Waldorf Paper Products and Hoemer Boxes merge. Second paper machine and two continuous digesters are installed. Capacity increased to 1,150 tpd, of which 150 tpd is bleached pulp.
- 1968: Mill issued first discharge permit by MDHES. Direct discharge allowed to Clark Fork River only in high flow (spring) conditions.
- 1969: Primary clarifier installed to remove suspended solids from wastewater prior to storage in settling ponds.

- 1970: Two recovery boilers constmcted along with other pollution control measures to reduce emission of odorous gases.
- 1974-1975: Mill installs secondary treatment aeration basins and three experimental 'rapid infiltration' percolation ponds designed to handle increasing wastewater production. Seven hundred acres of settling ponds are in existence. One-third of 15.7 million gallons per day (mgd) of wastewater effluent is discharged directly to Clark Fork River following primary (clarifier) and secondary (aeration basins) treatment. Remainder of wastewater either evaporates or infiltrates through bottom of ponds. An additional 8 mgd of uncontaminated non-contact cooling water is discharged to the river after passing through a ditch to a low lying area to the north of the mill site. First Montana Pollution Discharge Elimination System (MPDES) permit issued in July 1975.
- 1977: Champion Intemational Company purchases mill and begins 3-year $170 million expansion to increase capacity to 1,850 tpd. Majority of wastewater (63 percent) is being disposed of through rapid infiltration ponds.
- 1978: Second MPDES permit issued.
- 1980: Third paper machine, support systems, and a waste wood boiler for power generation installed.
- 1982: Third MPDES permit issued.
- 1983: Champion applies for permit to allow a portion of effluent to be directly discharged to Clark Fork River throughout the year as rapid infiltration ponds have largely clogged and lost their infiltration capacity.
- 1984: MDHES issues 2-year temporary permit allowing year-round direct discharge (only if flows were greater than 1,900 cubic feet per second [cfs]) and begins study to determine its effects on river. Only 14 percent of wastewater is infiltrating through ponds.
- 1986: Stone Container Corporation purchases mill. MDHES extends permit until an addendum can be completed.
- 1988: Stone Container Corporation completes constmction of color removal treatment system to address additional color contributed to wastewater by bleach plant.
- 1990: Old Cormgated Container (OCC) facility added to recycle (repulp) old cardboard containers. First documentation of on-site asbestos disposal.
- 1991: Expanded array of site-wide groundwater monitoring wells installed to comply with MPDES permit.

- 1993: Pulp mill production is approximately 1,900 tons of pulp per day (1,500 tons of virgin kraft pulp from wood chips and 400 tons from repulping old cormgated containers). Closure of three onsite disposal areas and beginning of offsite disposal of asbestos.
- 1994: Montana DEQ issues a Class III landfill license to Stone Container Corporation for land north of Pond 16 (Landfill 'G').
- 1995: New MPDES permit issued addressing nutrients for first time and requiring surface water mixing zone study.
- 1997: Sludge dewatering facility constmcted and becomes operational.
- 1998: Name becomes Smurfit-Stone Container Corporation when Jefferson Smurfit Corporation merges with Stone Container Corporation.
- 1998: Combined air and water pollution regulations, commonly referred to as the "Pulp and Paper Cluster Rules", are promulgated by EPA. Rules include increased monitoring, containment, and treatment requirements, and also regulate the discharge of chlorinated pollutants from bleaching operations at kraft pulp mills.
- 1999: Bleaching plant operations cease, Color Removal Plant treatment discontinued.
- 2000: Five-year MPDES permit issued with reduced levels for nitrogen and phosphoms, and requirements for delineating the groundwater mixing zone.
- 2001-2004: Business conditions curtail production to 1,600 tpd of linerboard from 1,100-1,200 tpd of virgin pulp and 550 tpd of recycled pulp from the OCC. Two of three paper machines in operation.
- 2004: Name changed to Smurfit-Stone Container Enterprises Incorporated.
- 2005: Smurfit-Stone Container Enterprises, Inc. applies for a Solid Waste Class III Landfill license for the Peterson Gravel Pits.
- 2009: Smurfit-Stone files for Chapter 11 bankmptcy in January.
- 2010: Smurfit-Stone emerges from bankruptcy, but shuts down mill in January.
- 2011: Mill property purchased by MLR Investments in March. Mill property purchased by M2 Green (Green Investment Group Incorporated) in May.

3.3 PROCESS DESCRIPTION AND WASTE TYPES GENERATED

Sawdust, woodchips and rejected timber ('pulp logs') provided the raw wood materials for the mill. Woodchips were brought to the mill by both tmck and rail at a rate of up to 3,700 tpd to produce up to 2,200 tpd of linerboard. Other raw materials used in the pulping process included:

clay, starch, caustics, 'hogged fuel' (bark, sawdust, and reject wood/chips burned for power generation), and various processing chemicals. From 1990 on, the mill recycled cormgated containers (up to 400 tpd), which provided raw fiber for pulping. Approximately 85 percent of the kraft linerboard produced at the mill was used domestically, being shipped to other facilities within the corporation (EPA 1993).

The basic process employed at the mill involved the following five steps:

- Raw material (wood) preparation,
- Separation of wood fibers (pulping),
- Removal of coloring agents (bleaching),
- Paper formation, and
- Power generation/recovery of chemicals.

Raw wood was received as wood chips, sawdust, and logs, which the facility was equipped to debark and chip. The second step, separation of wood fibers or pulping, was accomplished by the use of chemicals (sodium hydroxide and sodium sulfide in a solution called 'white liquor') used at high temperatures with pressures to dissolve impurities and lignins that bind the wood fibers together in process vessels called digesters (large pressure cookers). The mill used both batch and continuous digesters. The resulting spent cooking chemical was called 'black liquor' (EPA 1993).

Removal of coloring agents (bleaching) was performed only if a light colored or white paper was desired. The mill used a four-step process to produce a specialty grade of white linerboard. Paper formation involved three stages of production: wet end, press section, and dryers. In the wet end, pulp was routed to the paper mill where various chemical additives such as rosin, alum (an aluminum sulfate complex used to precipitate the rosin onto the paper), dyes, and clay (a filler) were added. The fiber slurry was screened, and a sheet was formed by distributing a web of fiber onto a continuously moving screen. The sheet was pressure rolled and then dried on heated cylinders. These processes served to reduce the moisture content of the product from over 99 percent to less than 6 percent.

The final step in the process was the reclamation of spent cooking liquor, which was concentrated using evaporators and burned in recovery boilers. Inorganic material (sodium and sulfur) in the concentrated black liquor was collected as a molten 'smelt' in the bottom of each recovery furnace and overflowed into a smelt dissolving tank, forming 'green liquor.' The green liquor was processed back into white cooking liquor through a recausticizing process using sodium hydroxide, lime kilns, lime mud filtering, washers, and clarifiers. The boilers supplied enough excess heat to generate steam power that was used to help mn the mill (EPA 1993).

From 1990, recycled pulp was also produced in the OCC facility by thermo-mechanical pulping processes that did not use the cooking liquors described above. Specialized equipment was used to remove impurities (i.e., waxes, glues, plastics, Styrofoam, plastic, staples). This recycled pulp contributed up to 550 tpd towards total pulp production.

Various hazardous chemicals were used or produced on site, including bleaching chemicals (liquid chlorine, sodium hypochlorite, and chlorine dioxide), liquid sulfur dioxide, liquid ammonia, sodium hydroxide, sodium salts, dimethyl disulfide, methylsulfide, liquors of high pH (white, green, and black) used in pulping, turpentine, acids (sulfuric, muriatic, and phosphoric), and non-condensable gases. Various quantities of bulk petroleum products, including diesel fuel and #6 fuel oil, were stored on site. Polychlorinated biphenyls (PCBs) were used in electrical transformers at the site, but it has been reported that these transformers have been removed (Marxer 2011). No spills appear to have been reported during removal activities. PCBs may also have been present as an additive in hydraulic fluids in equipment, such as those found in the rail car dump area, the hog fuel unloading area, the baler room of the OCC, and the bleach plant.

The use of chlorine for the bleaching of pulp produces chlorinated organic compounds, including dioxins, furans, phenols, guaiacols, catechols, chloroform, and numerous others through the reaction of chlorine with residual lignin (EPA 1990). Concerns over the release of these compounds prompted the development of elemental chlorine free (ECF) and totally chlorine free bleaching processes. The vast majority of worldwide bleached pulp producers today utilize ECF. Organic halides are also of concem at kraft pulp mills where bleaching has been performed (EPA 1993).

Potential sources of metals at pulp and paper mills include chemical additives to the pulping process, biocides that contain mercury, and dyes such as cadmium salts. Fly ash from boilers may concentrate naturally occurring metals found in soils.

From 1986 through March 2010, the mill was registered under the Resource Conservation and Recovery Act (RCRA) as a Small Quantity Generator of hazardous waste (specifically in 2009 for ignitable waste, mercury, methyl ethyl ketone, and methylene chloride) (MDEQ 2011a).

Waste types generated at the mill included solid, liquid, and gaseous emissions. Solid wastes were landfilled on site in at least four separate areas until October 1993, when the landfills were closed to comply with solid waste disposal laws (Smurfit-Stone 2004). Also in 1993, Smurfit-Stone licensed and began using a Class III (inert material) disposal site located in the northwestern area of the mill site (Landfill G on Figure 2). In November 2005, Smurfit-Stone applied for a license for an additional Class III landfill to convert the Peterson Gravel Pits on the site to a landfill. This license appears to have been denied. After 1993, Class II wastes (e.g., general refuse, fly ash, asbestos) generated by the facility were disposed of off site at BFI's Missoula landfill.

Waste types generated by the mill are shown in the following table (MDHES 1974, 1985; EPA 1993; Smurfit-Stone 2004; MDEQ 2010a):

TABLE 1
Waste Types Generated at the Smurfit-Stone Mill

Waste	Possible Contaminants	Approximate Volume Generated (Annually)	Disposal Location
SOLIDS			
Primary sludge[1]	Dioxins, furans, PCBs, organic halides, chlorinated phenols, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), arsenic, cadmium and other metals	20,000 tons	Onsite (ponds 3, 4, 5, 17, and likely ponds 19 (aka Landfill D) and 20 (aka Landfill E)
General municipal waste[2]	Industrial chemicals (e.g., solvents), hydrocarbons, degradation products	148,000 cubic yards (yd^3)	Onsite (Landfill A) until 1993, then offsite to BFI
Hog Fuel ash and fly ash[3]	Probably non-hazardous, unless non-wood fuel was burnt in boiler	20,000 yd^3	Hog fuel ash: onsite (Landfill 6, Landfill C) until 1993, then offsite to BFI Fly ash: onsite (ponds 3, 4, 5, 17)
Lime kiln/slaker grits[4]	Probably non-hazardous, but is caustic if not washed	17,000 yd^3	Onsite (Landfill 6, Area C) until 1993, then sludge ponds
Ragger wire[3]	Probably non-hazardous	7,000 yd^3	Onsite (Landfill C) until 1993, dien offsite to BFI

TABLE 1
Waste Types Generated at the Smurfit-Stone Mill

Waste	Possible Contaminants	Approximate Volume Generated (Annually)	Disposal Location
Asbestos insulation[6]	asbestos	Onsite (total generated 1990-1993): 2,870 linear feet (lf) of pipe insulation, 1,078 square feet (ft^2) of boiler insulation Offsite (total generated 1990-2008): 17,758 lf of pipe insulation and 13,997 ft^2 of other materials	Onsite (Landfills A, C, F, G and 6) and offsite until 1993, then all offsite to BFI
Woodyard waste[7]	Probably non-hazardous	12,000 yd^3	Onsite (Landfill G)
		LIQUIDS	
Wastewater[8]	Dioxins, furans, PCBs, organic halides, chlorinated phenols, petroleum hydrocarbons, PAHs, arsenic, cadmium and other metals, nutrients	Up to 6.02 billion gallons (e.g., 1984). Avg. 5.7 billion gallons (e.g., 2009).	Combination of: • direct discharge to Clark Fork River (1958-1984 during high flows only, 1984-2010 year round if flows >1,900 cfs), • 'rapid infiltration' through ponds to groundwater (1974-1983), • pond seepage to groundwater (1958-2010), and • evaporation (1958-2010)
Black, green, white liquors; bleaching waste streams[9]	high pH liquids, chlorine, salts, acids (sulfuric, muriatic, and phosphoric)	Approx. 1 billion gallons	Largely recovered and recycled, but some losses to sewer due to overflows, spills, and wash-ups. Sewer reported to wastewater treatment system.
Cooling water (non-contact)	Non-hazardous unless spills or leaks occurred	Avg. 2.37 billion gallons	Direct discharge to Clark Fork River (1958-2010)
		GASES	
Total reduced sulfur compounds; oxides of sulfur (SOx); oxides of nitrogen (NOx)	• hydrogen sulfide (H2S), • methyl mercaptan, • dimethyl sulfide, • dimethyl disulfide, SOx, NOx	Varies per source, up to limits imposed by Montana Air Quality Permit issued for site (#2589-15)	Discharge to air controlled variously by electrostatic precipitators, wet scrubbers and wet venture scrubbers, baghouses, air and steam strippers

TABLE 1
Waste Types Generated at the Smurfit-Stone Mill

Waste	Possible Contaminants	Approximate Volume Generated (Annually)	Disposal Location
Particulates	• sodium sulfate, • sodium carbonate, • other sodium compounds	Varies per source, up to limits imposed by Montana Air Quality Permit issued for site (#2589-15)	Discharge to air controlled variously by electrostatic precipitators, wet scrubbers and wet venture scrubbers, baghouses, air and steam strippers

1 Primary sludge was the underflow from the primary clarifier, and was reported to have been primarily composed of water, hog fuel ash, lime, calcium carbonate mud, green liquor dregs (unbumed carbon from recovery boilers) and 1 percent wood pulp fiber. However, the clarifier also received effluent from all site drainage (i.e., sewers) and process streams, including the pulping mill and the paper mill areas, and the 'clearwater' sewer originating at the white water and stock tank overflow (excess water derived from the drying of paper). All onsite spills would have reported to these sewers.
2 General municipal waste consisted of miscellaneous waste such as paper, plastic, wood, scrap metal, glass, and small amounts of food.
3 Hog fuel ash originated from multicyclone collectors on two bark boilers and from the bottom grates in the boilers.
4 Lime kiln/slaker grits are unreacted lime kiln product that was rejected from the slaker where rebumed lime (CaO) was added to green liquor ($NaOH + Na_2S$).
5 Ragger wire was plastic and metal wire that held bales of old cardboard containers together.
6 Asbestos originated from disturbed insulation and through maintenance and replacement of equipment.
7 Woodyard waste was generally wood chips that got mixed with soil and rocks at the bottom of a stockpile.
8 Approximately 200 organic compounds have been identified in pulp, paper, and paperboard wastewaters. The principal waste parameters of concem with these waters are wood waste residuals that produce biological oxygen demand (BOD), pH, total suspended solids, and effluent color from bleaching operations.
9 Black liquor was spent cooking liquor remaining after the digesting process. It contained spent cooking chemicals, ligins, and other extractions from the pulp with a solids content of ~18 percent. After further evaporation, ligins and organic wastes were burned in power recovery boilers. Molten inorganics (e.g., sodium and sulfur) were recovered in the bottom of the recovery fumace, forming green liquor. Green liquor was processed back into white liquor in the recausticizing process, which used lime kilns, slakers, lime mud filters, washers and clarifiers. Its chemical constituents were largely sodium hydroxide and sodium sulfide.

The pulp and paper industry uses a large volume of water as a fiber carrier and solvent. As little of this water was recycled at the Smurfit-Stone facility, it generated vast amounts of wastewater, up to 6.02 billion gallons per year.

During its initial operation, all wastewater was apparently released directly to the Clark Fork River without treatment (Nielsen 1987). Beginning in 1958, wastewater was stored onsite in unlined ponds from July through February before being discharged to the river under high flow, spring runoff conditions (March through June). During the storage months, a substantial amount of water seeped through the bottom of the storage ponds. Over the years, as the mill expanded and as the seepage rates from the ponds decreased due to accumulation of biological and residual organic solids in the bottom sediments of the ponds, additional storage ponds were constmcted. By 1971, 15 ponds had been constmcted covering approximately 750 acres (MDHES 1974).

A primary clarifier was constmcted in 1969 to remove solid constituents (primary sludge) from the wastewater, which was pumped into four sludge ponds. Beginning in 1974, the mill experimented with 'rapid-infiltration' gravel basins as a means to facilitate seepage rates into groundwater. This process largely ended by 1983 due to clogging of the basins by organic matter.

Secondary treatment, through the use of two aeration basins, also began at the mill in 1974. A third basin was added in 1990. From the aeration basins, wastewater flowed to polishing ponds, and then to a series of storage ponds before discharge to one of three outfalls. Year-round discharge of treated wastewater to the Clark Fork River began in 1984, being permitted only when river flows exceeded 1,900 cfs (Smurfit-Stone 2004).

Wastewater flow diagrams are presented in Appendix E (Smurfit-Stone 2004).

3.4 PREVIOUS INVESTIGATIONS

Previous environmental investigations at the site appear to have been undertaken, by both the mill and by the MDHES, primarily to document surface and groundwater quality in an effort to understand and address nutrient loading to the Clark Fork River. For example, beginning in 1983 the MDHES conducted a 2-year study to determine the effects of year-round direct discharge of wastewater from the mill to the Clark Fork River (MDHES 1985). The study documented nutrient, suspended solids, dissolved oxygen, ammonia and metals, and color concentrations in the river; investigated its ecological health (e.g., macro-invertebrate sampling); and identified aesthetics (especially the appearance of foam and colored water), groundwater pollution of the shallow aquifer, and ongoing air quality degradation (especially odor and particulates) as areas of concem.

The 1995 MPDES discharge permit required the mill to conduct a surface water mixing zone study to delineate the boundary conditron of the mixing zone for the direct discharge of wastewater to the Clark Fork River (Hydrometrics 1996). The finding of this study determined that the downstream monitoring station for the Mill (i.e., the Huson sampling station located 6 miles downsfream from the site) was a valid location for compliance monitoring and a reasonable location for determination of the mixing zone boundary.

The MPDES permit issued in 2000 required that the mill delineate the groundwater mixing zone boundary condition, defined as the extent of travel of seepage where the groundwater concentration for total dissolved solids (TDS) was greater than or equal to 500 milligrams per liter (mg/L). The permit also required Smurfit-Stone to monitor groundwater wells (Photo 11) for the purpose of establishing correlation factors for concentrations of nutrients between newer and older monitoring wells. This investrgative work was completed in November 2004 and found that groundwater with TDS concentrations > 500 mg/L was largely contained between Marcure Lane on the north, Mullan Road on the east, and the Clark Fork River to the west; and that water quality sampling within seven residential wells near the downgradient boundary of the mixing zone showed high quality drinking water with no influence of process wastewater constituents or TDS from the shallow alluvial groundwater system (Hydrometrics and Inskeep 2004).

Environmental compliance monitoring performed at the site included the following (EPA 1993, MDEQ 2010b, Smurfit-Stone 2004):

- wastewater discharge: nutrients (nitrogen and phosphoms), pH, BOD, total organic carbon (TOC), total suspended solids (TSS), ammonia, color, and toxicity, with occasional testing for dioxins;
- non-contact cooling water discharge: oil sheen, foam, temperature, and weekly pH;
- groundwater: nutrients, color, sodium, and BOD every 2 months to determine seepage contribution the Clark Fork River;
- In-stream monitoring of the Clark Fork River: color, temperature, dissolved oxygen, and nutrients; and
- air: total reduced sulfur, opacity, NOx, sulfur dioxide, total suspended particulates, and particulate matter smaller than 10 microns in diameter (PM10).

Site assessments have apparently been performed at six of eight petroleum storage tank locations at the site. The assessments found evidence of leaks at three of the tanks. The remediation of the releases is being overseen by the Petroleum Release Section of the MDEQ.

Previous investigations by the EPA appear to be limited to a chemical safety audit conducted by the Region 8 Technical Assistance Team from Febmary 9 through 12, 1993. The purpose of the audit was to document facility processes, chemical hazards, accidental release prevention practices, and emergency response preparedness and planning (EPA 1993).

3.5 SITE GEOGRAPHY, GEOLOGY, HYDROGEOLOGY AND METEOROLOGY

3.5.1 Geography

The Smurfit-Stone Mill site is located within Missoula Valley of the Clark Fork Basin. The basin is bounded by the Continental Divide on the east and south, the Montana-Idaho state line on the west, and the Flathead River-Clark Fork divide to the north. The Missoula Valley is wedge-shaped and includes both the Missoula and Ninemile Valleys.

The Valley has an area of about 180 square miles and is drained by the Clark Fork River, Ninemile Creek, and their tributaries (USGS 1999).

3.5.2 Geology and Hydrogeology

The Missoula Valley was flooded and drained during successive glaciations and interglaciations in the Pleistocene Epoch (1 million years ago to 25,000 years ago). About 12,000 years ago, the Missoula Valley lay beneath a lake nearly 2,000 feet deep. Glacial Lake Missoula formed as the Cordilleran Ice Sheet dammed the Clark Fork River just as it entered present day Idaho. Fill from the lake is estimated to reach a maximum depth of 3,000 feet within the valley (Montana Bureau of Mining and Geology [MBMG] 1965).

The mill site is underlain by alluvial sands and gravels, bounded on the west side of the Clark Fork River by Precambrian bedrock and by fine-grained Lake Missoula deposits immediately east. The shallow alluvial sands and gravels are approximately 25 to 35 feet thick beneath the mill site and thin to the east. Depth to groundwater across the site in July/August of 1991 varied from 2.4 to 19.8 feet (Grimestad 1992). Fine-grained Lake Missoula sediments (clays and silts) extend beneath the shallow alluvial gravels and are approximately 120 to 150 feet thick. The Lake Missoula sediments are underlain by a thick coarse-grained alluvial aquifer. This deeper aquifer system is the principal aquifer for water supply in the area, including Smurfit-Stone's production wells (MBMG 1998, Hydrometrics and Inskeep 2004).

The fine-grained Lake Missoula sediments have a reported vertical permeability of 3.5×10^{-5} centimeters per second (cm/s). The estimated hydraulic conductivity of the deep alluvial aquifer is 5.3×10^{-1} cm/s (Grimestad 1992).

3.5.3 Meteorology

The mill site is located in a semiarid climate zone. Prevailing wind direction is from the northwest. The mean annual precipitation as totaled at the Missoula International Airport is 13.81 inches (National Oceanic and Atmospheric Adminisfration [NOAA] 2011a). The 2-year, 24-hour rainfall event for this area is 1.37 inches (NOAA 2011b).

4.0 PRELIMINARY PATHWAY ANALYSIS

4.1 SOURCE CHARACTERIZATION

Potential sources of contamination at the site include: sludge ponds, aeration basins and treated water ponds, an emergency spill pond, landfills and other dumping locations, various process areas within the industrial footprint, a former landfarming area, and above- and underground storage tanks (Figure 2). These potential sources are discussed individually in sections below[1].

Contaminants of concem at similar pulp and paper mills across the country have included PCBs, petroleum hydrocarbons, PAHs, arsenic, cadmium, lead, and other metals.

In addition, the use of chlorine for the bleaching of pulp produces chlorinated organic compounds, including dioxins, furans, phenols, guaiacols, catechols, chloroform, and numerous others through the reaction of chlorine with residual lignin (EPA 1990). Organic halides are also of concem at kraft pulp mills where bleaching has been performed (EPA 1993).

4.1.1 Sludge Ponds

From 1958 until a primary clarifier was installed in 1969, ponds on the site received untreated effluent. From 1970 until the first aeration basin was installed in 1974, the ponds received only primary-treated effluent. Following the installation of the primary clarifier, approximately 20,000 tons of sludge was generated on a yearly basis and pumped to four sludge ponds (Ponds 3, 4, 5, 17) (Photos 2, 3, 17, 18, 19, and 21) (Figure 2). These four ponds cover 91 surface acres, vary in depth from approximately 7 feet (Pond 17) to 14 feet (Pond 5), and contain approximately 899 acre-feet in total. It is not clear when these four ponds were first constmcted, but their location close to the plant, it follows that they would have been some of the earliest ponds built (i.e., late 1950s). It has been reported that Pond 4 is the oldest sludge pond and thus had been receiving sludge the longest (Marxer 2011).

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1 Note regarding identification of ponds: A number of ponds at the mill have been assigned different names over the years by different information sources, and/or as a result of land use changes. For example, wastewater Pond 14 was converted into an aeration basin (basin I or III depending upon the source of information), and Pond 15 was later converted into the North Pohshing Pond. Pond 6 is also identified as an area that has received solid wastes, as have Ponds 19 (aka area D) and Pond 20 (aka area E). For ease of understanding, such areas have both names listed on Figure 2 and any area where wastes have been buried onsite are identified in this report as landfills (e.g., Landfills A, C, E, F, G, 6) and not as ponds or areas.

Ponds built at the site were not lined, and percolation of wastewater through the bottom of the ponds into the shallow alluvial aquifer was relied on as a means of water disposal (MDHES 1974, Smurfit-Stone 2004). During the site visit, no evidence of mnon/runoff controls, or covers for dust control (with the exception of a layer of wood chips recently placed over Pond 3) or the prevention of precipitation infiltration were noted.

At the time of the site reconnaissance on June 22, 2011, all four sludge ponds were completely or nearly dry (Photos 2, 3, 17, 18, 19, and 21).

Primary (from the clarifier) and secondary (dredged from basins and ponds) sludge was reportedly also disposed into two smaller ponds (19 and 20, aka Landfills D and E) (Figure 2) to the north of the four larger sludge ponds (Stone Container 1992).

The clarifier received effluent from three site drainages (i.e., sewers) and process streams, including the pulping mill and the paper mill areas, and the 'clearwater' sewer originating at the white water and stock tank overflow (excess water derived from the drying of paper) (EPA 1993) (Appendix E). The sludge primarily consisted of fiber solids, but also included a quantity of inorganic solids from the recausticizing operation (primarily calcium carbonate) and fly ash from the multi-fuel boiler, which were also directly pumped to the ponds (Smurfit-Stone 2004). Beginning in 1997, a sludge dewatering facility processed the sludge to remove additional liquid (reducing volume being sent to the ponds) and to provide a fuel source for the multi-fuel boiler (Smurfit-Stone 2004).

Previous studies have shown that when chlorine is used as a bleaching agent for brightening and purifying wood pulp, polychlorinated dibenzodioxins (PCDDs) including 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), and polychlorinated dibenzofurans (PCDFs), including 2,3,7,8-tefrachlorodibenzofiiran (2,3,7,8-TCDF), can be formed (EPA 1987). Although these compounds may be present in treated effluent, wastewater sludges, and in the bleached pulps themselves, the highest concentrations were found in sludges. The compound 2,3,7,8-TCDD is strongly absorbed to soils or sediments and is considered to be essentially non-biodegradable in the environment (EPA 1990).

It is also possible that PCBs associated with hydraulic oil releases into wastewater at the site could have been discharged into the sludge ponds.

4.1.2 Emergency Spill Pond

The three sewer/process streams were continuously monitored for flow rate and conductivity to allow for the identification of spills and process upsets. When this occurred, flows could be diverted to an emergency spill pond (aka Pond 8) before they reached the wastewater treatment system (EPA 1993, Smurfit-Stone 2004) (Figure 2). The dates, quantities, and constituents of any spills that may have occurred are unknown.

The pond is divided into two cells, one being a 'dry' cell reportedly held in reserve unless needed (Marxer 2011). The 'dry' cell has also been reported as previously being a sludge pond, but was isolated in the early 1990s in anticipation of its being used as the next general refuse waste disposal location (MDHES 1992, Stone Container 1992). The two cells have a combined surface acreage of 24 acres, an average depth of 5 feet, and a capacity of approximately 120 acre-feet. The date Pond 8 was constmcted is not known. There is no evidence in available documents that the pond was lined.

At the time of the site reconnaissance on June 22, 2011, the 'wet' cell of Pond 8 was mostly dry, while the 'dry' cell was dry and revegetated (Photos 5, 24, 25, 27, 30, 31). A breach was noted in the northwest comer of the 'wet' cell (Photo 27), although it is not clear when or why the breach occurred. There was no evidence of an engineered liner or mnon/mnoff controls.

4.1.3 Aeration Basins, Polishing Ponds, and Wastewater Ponds

Beginning in 1974, after sludge was removed from the clarifier, wastewater was transferred to aeration basins (Photos 4, 5, 26) which were operated in series (Smurfit-Stone 2004, Appendix E) (Figure 2). Aeration basins I and II were constmcted in 1974-1975 following the installation of the clarifier, while aeration basin HI (Pond 14) was constmcted in 1990. In addition to aeration, supplemental nutrients (nitrates and phosphates) were added to the basins to enhance and maintain bacterial populations to assist with water treatment. The three basins have a combined surface area of 56 acres, an average depth of 12 feet, and a total capacity of approximately 670 acre-feet.

The north (Pond 15) and south polishing ponds were used for further settling of biological solids after aeration of the wastewater (Photo 4). Water from the north polishing pond could be diverted, if needed, to the Color Removal Plant for further reduction in color. As the bleaching process contributed a proportionally large amount of color to the wastewater, this diversion primarily occurred prior to 1999 when the bleach plant was closed (Smurfit-Stone 2004). The two polishing ponds have a combined surface area of 43 acres, an average depth of 7.6 feet, and a total capacity of 328 acre-feet.

After polishing, treated wastewater was diverted to twelve storage ponds prior to discharge from three permitted outfalls to the Clark Fork River (Ponds 1, 1A, 2, 7, 9, 10, 11, 12, 13, 13A, 16, 18) (Photos 1, 6, 12, 13, 15, 28). The 12 ponds have a combined surface area of 707 acres, an average depth of approximately 8 feet, and a total capacity of 5,772 acre-feet. At the time of the site reconnaissance, some of the ponds were vegetated, while others were filled with wastewater.

It is assumed that possible contaminants in the basins and polishing and storage ponds are similar to those in the sludge ponds (e.g., PCBs, dioxins, furans), but if present, would be expected to be at lower concentrations due to immobility. Ponds built at the site were not lined, and percolation of wastewater through the bottom of the ponds into the shallow alluvial aquifer was relied on as a means of water disposal (MDHES 1974, Smurfit-Stone 2004). Many wastewater ponds adjacent to the Clark Fork River (e.g., Ponds 2, 7, 11) (Figure 2, Photo 1) lie within the 100-year flood plain (FEMA 1988). The ability of their levees to provide flood protection has been questioned (Missoula County 2011).

4.1.4 Landfills and Other Dumping Locations

The mill landfilled all facility-generated solid waste onsite from the inception of the mill (1957) until 1993. The majority of landfilling occurred in an area immediately adjacent to and west of the core industrial area of the mill (Landfill A on Figure 2). Disposal primarily occurred in three areas (Stone Container 1992):

- Landfill A: General refuse (including, but not limited to paper, plastic, scrap metal, wood, glass, and small amounts of food);
- Landfill (Pond) 6: hog fuel ash, lime kiln grits, and;
- The adjacent Landfills C (hog fuel ash, lime kiln grits, ragger wire) and F (asbestos).

After being capped with 18 inches of clay and 6 inches of topsoil, formal closure of these three areas occurred in September 1995 (MDEQ 1995). There is no evidence in available documents that any landfilling area was lined.

It should be noted that photographs reportedly taken at Landfill A in 1992 show unidentified drums amongst the waste (MDHES 1992).

Beginning in October 1993, all Class II waste generated by the mill (e.g., general refuse, ragger wire, multi-fuel boiler ash, used oil filters) was hauled offsite for disposal by BFI Inc. for disposal in BFI's Missoula landfill, while Class III material (e.g., sawdust, wood chips mixed with soil and gravel, log yard wood wastes, kiln bricks, small quantities of tires and other inert material) was landfilled in a newly permitted area (Landfill G) adjacent to and north of Pond 16 (Stone Container 1995, Smurfit-Stone 1995). Double-bagged asbestos has also been disposed of in this location (Stone Container 1992).

The main facility general refuse landfill (Landfill A) has a surface area of 16 acres and an average depth of about 6 feet. Landfill (Pond) 6 has a surface area of 16 acres with an unknown average depth. Landfills C and F have surface areas of approximately 8 acres and 3 acres, respectively. Note that some information sources combine C and F into one landfill area. The Class III landfill begun in 1993 (Landfill G) has a surface area of approximately 6 acres (Figure 2).

During the site reconnaissance, an area used to store disused equipment (i.e., the 'boneyard') was noted due west of the south polishing pond (Photo 29) (Figure 2).

It should be noted that cases of random dumping of material have also been alleged by former mill employees, including a report of PCBs being buried beneath the concrete floor of a building (Nielsen 2011, MDEQ 2011c).

4.1.5 Industrial Area (Recausticizing Area; Liquor Alley; Bleach Plant; Truck, Railcar, and Hog Fuel Unloading Areas; Sewer Lines and Sumps)

The main industrial area of the mill covers approximately 100 acres (Photos 2, 8, 9, 17, 18, 33, 35, 36, 38, and 39). The making of pulp and paper using the kraft process is complex (Photo 37) and uses (or produces) various hazardous chemicals including bleaching chemicals (liquid chlorine, sodium hypochlorite, and chlorine dioxide), liquid sulfur dioxide, liquid ammonia, sodium hydroxide, sodium salts, dimethyl disulfide, methylsulfide, liquors of high pH (white, green, and black), turpentine, acids (sulfuric, muriatic, and phosphoric), and non-condensable gases. Various quantities of bulk petroleum products, including diesel fuel and #6 fuel oil, were also stored on site and used for power generation (Photo 36). Truck and train unloading facilities within the industrial area of the mill utilized large hydraulic equipment (Photo 9). Some such equipment historically contained PCBs as additives (Agency for Toxic Substances and Disease Registry [ASTDR] 1997). Hydraulic equipment was also used in the baler room of the OCC, and the bleach plant.

Although the kraft pulping process used at the mill depended heavily on the recovery and reuse of chemicals (particularly from the high pH liquors), the plant was designed such that 'sewer' lines from various areas of the facility would capture any leaks, spills, and overflows from transfer, handling, and storage systems, and direct them to the primary clarifier (MDHES 1974, EPA 1993, Smurfit-Stone 2004).

The acid tanks were equipped with secondary containment, as were the # 6 fuel oil tank and all transformers (EPA 1993). Equipment maintenance procedures reported to have been in place included the regular inspection and replacement of process lines (e.g., batch digester, chlorine, sulfur dioxide, acid transfer hoses). Spills of petroleum or chemicals of sufficient volume were directed to the mill's sewer system. Spills that reached the sewer system could be manually routed to the emergency spill pond (Pond 8) before reaching the primary clarifier (EPA 1993). In the case of petroleum spills, a Seacurtain booming system was available to contain the spill and allow it to be removed from the pond with a vacuum truck (EPA 1993).

The site reconnaissance conducted on June 22, 2011 did not include an inspection of the core industrial facility. As such, the identification of discrete point sources of potential contamination within the facility (e.g., sewer sumps, sewer line leaks) was not possible.

4.1.6 <u>Landfarming Area</u>

Landfarming of petroleum-contaminated materials is reported to have occurred on a parcel of mill property located south of and adjacent to Lacasse Lane (Figure 2) (Photo 7). While no written documentation of this activity was found, the practice was acknowledged by Neal Marxer, former Technical Services Manager at the mill during the site reconnaissance (Marxer 2011). It is possible that landfarmed material included hydraulic fluid containing PCBs.

4.1.7 Above Ground and Underground Storage Tanks

The MDEQ Waste and Underground Tank Bureau has records of eight storage tanks (four above ground tanks [ASTs] and four underground tanks [USTS]) (Photo 36). 0Site assessment activities revealed evidence of leaks at three of the tanks. According to the MDEQ's Leaking Undergroumd Storage Tank Query System, two tanks are listed as undergoing characterization and/or remediation. The tanks are summarized in the following table (MDEQ 2011b):

TABLE 2
Summary of Petroleum Storage Tanks at the Smurfit-Stone Mill

Tank (DEQ ID)	Contents	Capacity (gals)	Closure Status	Assessment Status
AST 1 (S5)	Bunker oil	1,000,000	Closed in place, 5/1996	Completed, leak detected
AST 2 (S6)	Bunker oil	300,000	Closed in place, 7/1996	Completed, no leak detected
AST 3 (S7)	Bunker oil	300,000	Closed in place, 7/1996	Completed, no leak detected
AST 4 (S8)	Not listed	21	Closed in place, 7/1996	Completed, leak detected
UST 1 (01)	Not listed	5,000	Closed in place, 7/1996	Completed, leak detected
UST 2 (02)	Not listed	5,000	Removed from ground, 6/1986	Not completed
UST 3 (03)	Not listed	10,000	Removed from ground, 6/1986	Not completed
UST 4 (04)	Not listed	5,000	Removed from ground, 7/1986	Completed, no leak detected

4.2 GROUNDWATER PATHWAY

The Smurfit-Stone Mill site is located adjacent to the Clark Fork River. The mill is underlain by a shallow alluvial sand and gravel aquifer. The alluvial aquifer is approximately 25 to 35 feet thick beneath the mill site and thins to the east. This alluvium is bounded on the west side of the Clark Fork River by Precambrian bedrock and by fine-grained Lake Missoula deposits immediately east of the mill site (Hydrometrics and Inskeep 2004).

The fine-grained Lake Missoula sediments extend undemeath the shallow alluvial gravels, are approximately 120 to 150 feet thick, and have a reported vertical permeability of 3.5×10^{-5} cm/s (Grimestad 1992). These sediments are underlain by a thick coarse-grained alluvial aquifer which is the principal water supply aquifer for both the mill and for local ranches (Hydrometrics and Inskeep 2004). The estimated hydraulic conductivity of this deep alluvial aquifer is 5.3 x 10^{-1} cm/s (Grimestad 1992).

Depth to groundwater within the shallow alluvial (unconfined) aquifer varied across the site from 2.4 to 19.8 feet in July/August of 1991 (Grimestad 1992).

Groundwater flow directions in the shallow alluvial aquifer are generally to the west and north in the vicinity of the mill, towards the river. However, flow directions vary seasonally in response to areal recharge, water level fluctuations in the mill's wastewater storage ponds, seasonal changes in the stage of the Clark Fork River, and seasonal flows in irrigation ditches (Hydrometrics and Inskeep 2004). Groundwater velocity measured in background wells on the mill site average 4 feet per day and hydraulic conductivity measured across the entire mill site averages approximately 335 feet per day (Grimestad 1992).

Ponds built at the site were not lined, and percolation of wastewater through the bottom of the ponds into the shallow alluvial aquifer was relied on as a means of water disposal (MDHES 1974, Smurfit-Stone 2004). As such, the shallow alluvial aquifer has been contaminated with mill effluent. As reported by the MDHES in the Environmental Impact Statement for the proposed expansion of the mill:

> *The shallow aquifer underlying the effluent storage ponds contains considerable seepage water from the pond system. Pond wastes have also entered the deep aquifer in the vicinity of the plant. The quality of percolated wastewaters is significantly inferior to natural groundwater.* (MDHES 1974, page 180).

In addition, Grimestad has stated:

> *...ongoing Mill chemical sampling indicates that the underlying groundwaters are already carrying a significant load of the expected leachate constituent chemicals from nearby storage pond and effluent-distribution ditch leakage.* (Grimestad 1992, page 11).

Although both Grimestad and Hydrometrics reported that groundwater flow occurs from the deeper aquifer, upwards to the shallow aquifer, MDHES reported in 1974 that, although there was a poor vertical hydraulic connection between the aquifers, pond wastes had already entered the deep aquifer due to leakage from the upper to the lower aquifer (MDHES 1974):

> *"There also is definite evidence of vertical movement of waste effluent from the upper shallow aquifer into the deep aquifer in the plant area. Movement of dissolved chemicals from waste ponds into plant production wells tapping the deep aquifer has been detected. The interaquifer movement has been accentuated by drawdown in the old plant production wells. This problem may be confined to the drawdown cone created by pumpage of production wells in the plant area. No chemical contamination has been noticed in deep wells peripheral to the [mill] property."* (MDHES 1974, pp. 114-115).

Whether releases to groundwater have occurred from other contamination sources (e.g., petroleum storage tanks, the industrial core area) is unknown. Groundwater analysis appears to have been limited to analytes related to general water quality (e.g., TDS, sodium) and nutrients, as per permit conditions (Smurfit-Stone 2004).

Numerous drinking water wells exist within 4 miles of the site (Table 3), including seven private domestic wells located along the northern boundary of the site and within the 'mixing zone boundary' for the site effluent (Hydrometrics and Inskeep 2004). All of the wells are completed in the deeper aquifer (total depths range from 141.5 to 169 feet below ground surface [bgs]).

Water quality samples collected from five of these seven residential wells showed no measured parameters above background levels and no evidence of influence from mill process water or constituents (Hydrometrics and Inskeep 2004).

All municipal water supply systems in the local area utilize groundwater (EPA 2011). The nearest municipal wells to the mill are two adjacent public supply wells for the Magnolia Estates located at 13475 Mullan Road, approximately 700 feet from the mill property boundary (and 1 mile upgradient from sludge pond 17) (MBMG 2011). According to the EPA Safe Drinking Water Information System, there are no records of any health-based violations reported by the State of Montana for this water supply. The next closest public supply wells are associated with the Frenchtown Valley View Trailer Court, located approximately ½ mile north of the northern boundary of the mill. While the State of Montana has reported multiple violations of coliforms above the maximum contaminant level (MCL) for this water system, violations for potential contaminants from the mill have not been reported (USEPA 2011d). Municipal supply wells located more distant from the site were not searched for health-based violations.

There are an estimated 4,364 people within 4 miles of the site who use groundwater domestically. A summary of commercial and private wells located within a 4-mile radius of the mill site is provided in Table 3 below:

TABLE 3
Wells within 4 Miles of the Smurfit-Stone Mill Site

Radius (in miles)	Number of Commercial and Private Wells	Estimated Population Served*
0 – 0.25	57	140
0.25 – 0.50	63	155
0.50 – 1.0	156	384
1.0 – 2.0	362	891
2.0 – 3.0	677	1665
3.0 – 4.0	459	1129
Total	1,774	4,364

* based on 2.46 persons per household for Missoula County.
Source: State of Montana, Department of Natural Resources and Conservation, Water Resources Division, 2011; US Census Bureau 2010 census.

The mill also used groundwater for the facility water supply. The Montana Ground-Water Information Center lists numerous records (over 40) for wells registered by previous owners of the mill property for industrial, fire protection, monitoring, and domestic use (MBMG 2011). The present status of these wells, and the intentions the current owners have for their future use or abandonment, is not clear.

4.3 SURFACE WATER PATHWAY

The western boundary of the site is the Clark Fork River, with the site having approximately 4 miles of river frontage (Photos 1, 6, 13, 14). Chloride-ion concentrations in mill site groundwater monitoring wells clearly show that mill effluent percolating through the wastewater storage ponds reaches the river (Grimestad 1992).

According to the 2008 Waterbody Report for the Clark Fork River, this stretch of the Clark Fork River (Fish Creek to Rattlesnake Creek) is impaired due to elevated levels of: arsenic, cadmium, copper, chlorophyll-A (algal growth), total nitrogen, total phosphorus, and organic enrichment (sewage). Some of the metals are due to mill tailings that were historically deposited into the Clark Fork River drainage upstream (i.e., from Butte, Montana downstream to Milltown, just upstream from Missoula). The nutrients and organics are largely attributed to municipal and industrial point sources of pollution such as the mill and the Missoula wastewater treatment plant (EPA 2011c).

The MDEQ has conducted water quality sampling from a number of locations along the Clark Fork River adjacent and near the mill site. The vast majority of data are related to general water quality monitoring (e.g., pH, temperature, cations and anions) and nutrient loading to the river, although metals have also been analyzed at some locations (e.g., Station ID: 4214CL06).

As part of its National Bioaccumulation Study, the EPA collected fish tissue from both a largescale sucker and a rainbow trout at a location on the Clark Fork River near the Huson sampling station (approximately 6 miles dovmstream of the mill site). The tissue from the sucker showed levels of various PCB congeners exceeding environmental or human health guidelines, as well as detectable amounts 2,3,7,8 TCDF. The rainbow trout was analyzed only for dioxins and furans but also showed a detectable amount of 2,3,7,8 TCDF (EPA 1992).

Effluent sampling results from a water sample collected from a wastewater storage pond as reported in the 2010 MPDES permit application state that 2,3,7,8 TCDD was not detected at a reporting limit of 3.9 picograms per liter (pg/l) (MDEQ 2010a).

Surface water targets include sensitive environments downstream of the site. All municipal water supply systems in the local area appear to utilize only groundwater (EPA 2011). It should be noted that shallow groundwater wells along the Clark Fork River downstream of the site would most likely be influenced by flows from the river (e.g., during spring runoff periods when the river would be a 'losing' stream).

The Clark Fork flows from the south to the north and has an annual mean discharge at a point below Missoula (USGS station 12353000, 4.5 miles west of Missoula) of 5,293 cfs (USGS 2011). Construction of the wastewater storage ponds on the mill site led to the relocation of the Clark Fork River channel to the west. Much of the mill site lies within the Federal Emergency Management Agency 100-year floodplain (FEMA 1988).

The mill site lies within the Clark Fork River valley and is generally flat, with an elevation range from approximately 3,070 feet near the mill facility to approximately 3,040 feet at the Clark Fork

River in the northwest comer of the site. Overland flow from the site would generally travel west towards the river, although much of it would be captured in ponds or diverted by various ditches and channels, such as the non-contact cooling water ditch (Photo 10).

O'Keefe Creek flows from east to west across the southern extent of the mill property, adjacent to Ponds 17 (sludge), 1A, and 2 (both treated wastewater storage) (Figure 2). The USGS reported a stream flow measurement of 186.0 cfs from O'Keefe Creek in 1980 (USGS 2011). The creek had a substantial flow during the site reconnaissance (Photo 16).

Approximately half of the ponds contain palustrine freshwater emergent wetlands. The National Wetlands Inventory Database identifies over 2,600 acres of riverine and palustrine wetland within 4 miles of the site, and riverine wetlands are continuous downstream of the mill for the entire extent of the 15-mile downstream target distance limit (TDL) (Appendix F) (USFWS 2011a). However, only a fraction of these are Hazard Ranking System eligible.

Within the TDL, there are approximately 135 acres of palustrine freshwater forested/shmb wetlands, and 8 acres of freshwater emergent wetland directly adjacent to the Clark Fork River, equating to over 8 miles of wetlands frontage.

The entrre length of the 15-mile TDL is considered a fishery with a Montana Fish, Wildlife and Parks (MFWP) fishery resource value of 1 (Outstanding). The MFWP Deep Creek fishing access site is located at the confluence of Deep Creek and the Clark Fork, approximately 0.5 mile upstream of the southern mill site boundary. The 423-acre MFWP Erskine fishing access site begins approximately 2.5 miles downstream of the mill site and stretches for approximately 2.5 river miles (MFWP 2011). There were an estimated 37,996 angling days per year on this segment of the Clark Fork River in 2009. Recreational fishing for the following species is reported in the fishery: brown trout, largemouth bass, mountain white fish, smallmouth bass, rainbow trout, northem pike, yellow perch, and westslope cutthroat trout (MFWP 2011). It is assumed that fish are caught for consumption, but evidence of this has not been gathered.

An estimate of the quantity of fish in the segment of the river adjacent to the mill could not be found. However, a 1990 fish survey along the Erskine fishing access site showed 17 brown trout for every 1,000 feet of river length (MFWP 2011). A 2007 stndy witnin the Deep Creek fishing access site found no mussels were present.

Numerous river rafting companies offer float trips on the Clark Fork River, although it is not clear if any float the segment of the river adjacent to the mill site.

The river segment adjacent to the mill is listed as a Wildlife Protected Area as it is a bald eagle nesting area, a big game critical wintering area, and a historical peregrine falcon nesting area (MFWP 2011).

Threatened and endangered species present within Missoula County are shown in Table 4 below (USFWS 2011b):

TABLE 4
Endangered and Threatened Species in Missoula County

Species Scientific Name	Common Name	Status
Haliaeetus leucocephalus	Bald Eagle	*
Ursus arctos horribilis	Grizzly Bear	Federally listed Threatened
Howellia aquatilis	Water Howellia	Federally listed Threatened
Lynx canadensis	Canadian Lynx	Federally listed Threatened
Salvelinus confluentus	Bull trout	Federally listed Threatened

*Though not currently listed as threatened or endangered by the USFWS under the Endangered Species Act, the bald eagle is still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

The Clark Fork River has been identified as nodal habitat for the federally listed endangered bull front. Nodal habitats are defined as waters that provide migratory corridors, over wintering areas, or are otherwise critical to the population at some point in its life history. Nodal waters are essential for the survival of migratory bull trout.

The Montana Natural Heritage Program (MNHP) lists 65 animal species of special concem, including 9 mammals and 23 birds, as well as 49 plant species of special concem as occurring in Missoula County (MNHP 2011).

4.4 SOIL EXPOSURE PATHWAY

Soil exposure targets could include a limited number of workers who are conducting salvage operations (e.g., removing equipment) from the industrial core of the mill. The number of current workers onsite is unknown, but during the site reconnaissance it appeared to be fewer than 20.

At the time of the site reconnaissance on June 22, 2011, all four sludge ponds as well as the emergency spill pond were completely, or nearly dry (Photos 2, 3, 15, 17, 18, 19, 24, 25, 27, 30, 31). Pond 3 had recently been covered with 10 to 12 inches of wood chips, reportedly for dust control (Marxer 2011) (Photo 18). It is feasible that fugitive dust emissions could occur from the surface of uncovered ponds.

After being capped with 18 inches of clay and 6 inches of topsoil, formal closure of the three former landfill areas (Landfills A, C and F, and 6) occurred in September 1995 (MDEQ 1995). These areas are currently largely revegetated (Photo 20).

The nearest residences are located in a small development approximately 0.5 mile east and southeast of the core industrial area (and within 0.25 mile of the mill property boundary). In addition, a ranch that lies within the boundary of the site is located approximately 1 mile due north of the industrial area of the mill site. Access to the core industrial area of the site is controlled, and there were security guards present at the facility entrance during the site reconnaissance. The entire 3,200-acre site was not fenced, however, and access could be gained from the Clark Fork River. Nevertheless, no evidence of public use was noted during the site reconnaissance.

Population within 4 miles of the site is shown in Table 5 below:

TABLE 5
Population within 4 Miles of the Smurfit-Stone Mill Site

Distance from Site	Population (# of persons)
On Site	0
0 – ¼ Mile	241
>¼ – ½ Mile	218
>½ – 1 Mile	85
>1 – 2 Miles	838
>2 – 3 Miles	1,836
>3 – 4 Miles	1,030
Total Population within 4 Miles	4,248

Source: U.S. Census Bureau 2000

Threatened and endangered species are described in the Surface Water Pathway section above.

4.5 AIR PATHWAY

The mill site is located in a semiarid climate zone. Prevailing wind direction is from the northwest. It is feasible that particulate contaminants (e.g., from the surface of the dry, uncovered sludge ponds) could be blown off site.

Total wetlands acreage within 4 miles of the mill site boundary is shown in Table 6 below:

TABLE 6
Wetlands within 4 Miles of the Smurfit-Stone Mill Site

Distance from Site	Wetlands (acres)
On Site	986
0 – ¼ Mile	261
>½ – ½ Mile	84
>½ – 1 Mile	260
>1 – 2 Miles	420
>2 – 3 Miles	430
>3 – 4 Miles	227
Total within 4 Miles	2,668

Source: USFWS 1975, National Wetlands Inventory.

Access to the core industrial area of the site is controlled and there were security guards present at the facility entrance during the site reconnaissance. The entire 3,200 acre site was not fenced, however, and access could be gained from the Clark Fork River. The nearest residences are located in a small development approximately 0.5 mile east and southeast of the core industrial area (and within 0.25 mile of the mill property boundary).

5.0 SUMMARY

The site began operation as a pulp mill in the fall of 1957. Later expansions and improvements allowed the facility to produce paper, primarily rolls of kraft linerboard, which is used in the production of cormgated containers (i.e., the outside layers of cardboard boxes). From 1960 through 1999 the mill bleached a portion of its pulp and paper. The mill shut down operations in January 2010.

Potential sources of contamination at the site include: sludge ponds, aeration basins and freated water ponds, an emergency spill pond, landfills and other dumping locations, various process areas within the industrial footprint, a former landfarming area, and ASTs and USTs. Contaminants of concem at similar pulp and paper mills across the country have included PCBs, petroleum hydrocarbons, PAHs, arsenic and other metals. In addition, the use of chlorine for the bleaching of pulp produces chlorinated organic compounds, including dioxins, furans, phenols, guaiacols, catechols, chloroform, and numerous others through the reaction of chlorine with residual lignin (EPA 1990). Organic halides are also of concem at kraft pulp mills where bleaching has been performed (EPA 1993).

The westem boundary of the site is the Clark Fork River, with the site having approximately 4 miles of river frontage. Ponds built at the site were not lined, and percolation of wastewater through the bottom of the ponds into the shallow alluvial aquifer was relied on as a means of water disposal (MDHES 1974, Smurfit-Stone 2004). As such, the shallow alluvial aquifer has been contaminated with mill effluent.

Chloride-ion concentrations in mill site groundwater monitoring wells clearly show that mill effluent percolating through the wastewater storage ponds reaches the river (Grimestad 1992).

At the time of the site reconnaissance on June 22, 2011, all four sludge ponds as well as the emergency spill pond were completely or nearly dry. Pond 3 had recently been covered with 10 to 12 inches of wood chips, reportedly for dust control (Marxer 2011). It is feasible that fiigitive dust emissions could occur from the surface of uncovered ponds.

All municipal water supply systems in the local area appear to utilize only groundwater (EPA 2011). Over 4,200 people live within 4 miles of the site.

Within the TDL, there are approximately 135 acres of palustrine freshwater forested/shmb wetlands, and 8 acres of freshwater emergent wetland directly adjacent to the Clark Fork River, equating to over 8 miles of wetlands frontage.

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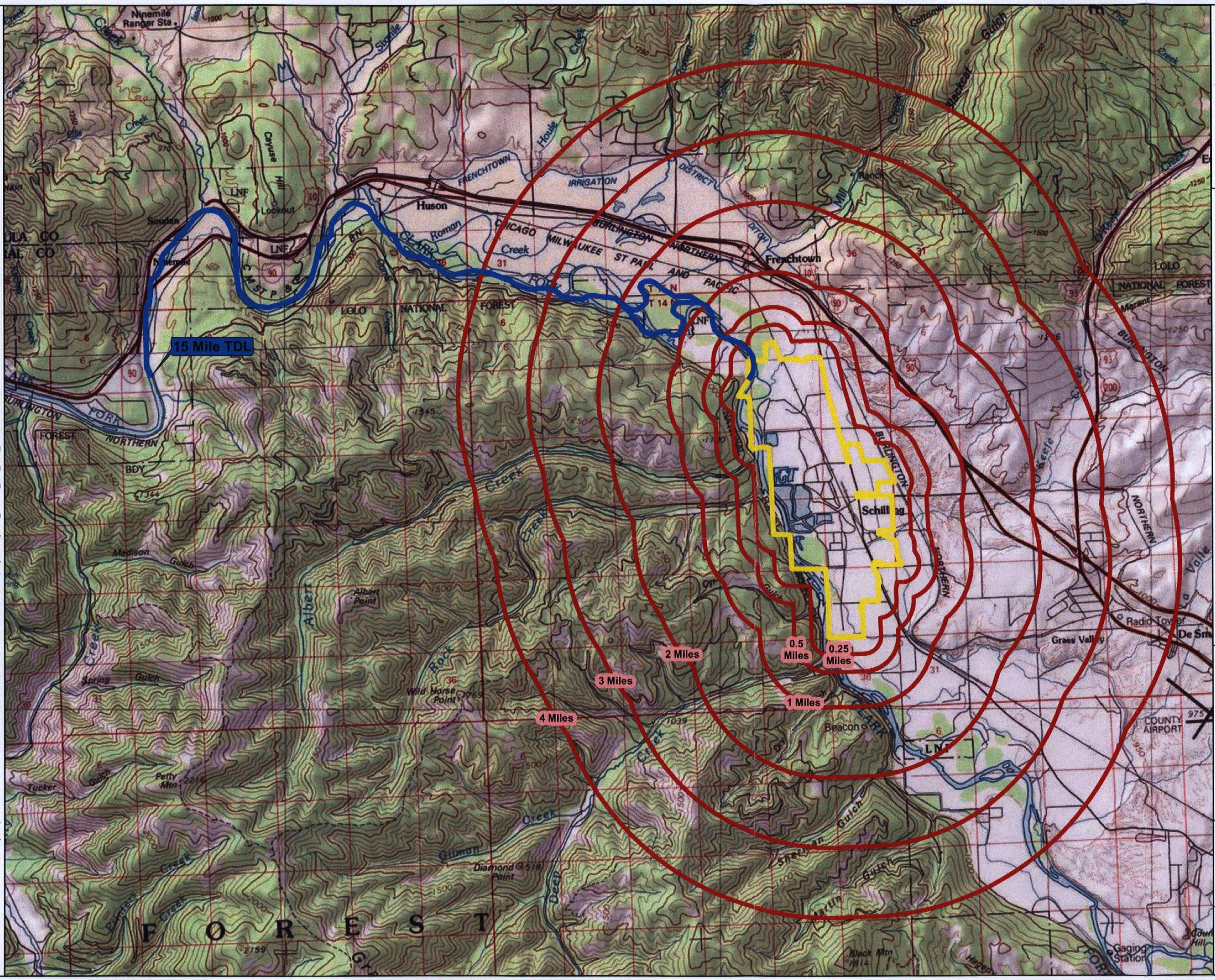


Legend

- Clark Fork 15 Mile Target Distance Limit
- 4 Mile Area of Influence
- Mill Site Boundary

TDD Title: **Smurfit-Stone Mill PA**

Figure Title: Site Location, Area of Influence, and 15 Mile Downstream Target Distance Limit

Figure No. 1
TDD State: MT
TDD County: Missoula
TDD: 1105-06
Date: 09/2011

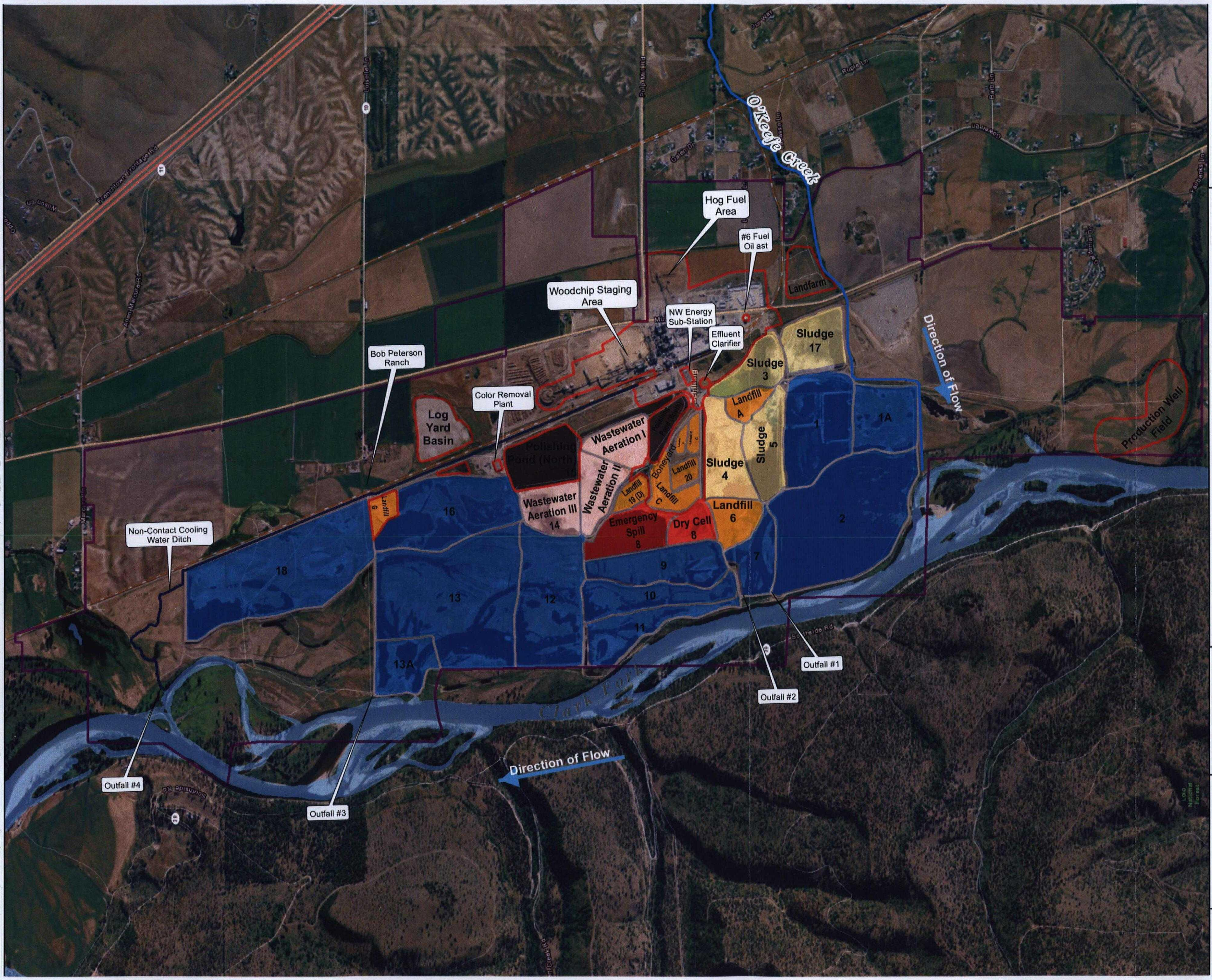
Base Data Source: Bing Maps 2011
Datum/Projection: NAD 1983 UTM Zone 11N
Page Size: 11x17

1 0.5 0 1 Miles

N

URS
OPERATING SERVICES

Author: Alex Mahrou Date/Time: Friday, September 09, 2011 1:54:47 PM File: T:\START3\Smurfit Stone Mill PA\GIS\Projects\Figure1_SiteLoc_AOI_DST_new.mxd



Legend

Mill Site Boundary

- Mill Site Boundary

Numbered Ponds and Landfills

- Site Features
- Landfills
- Treated Wastewater Storage Ponds
- Aerated Stabilization Basins Treatment Ponds
- Polishing Ponds
- Sludge Ponds
- Emergency Spill Pond

TDD Title: **Smurfit-Stone Mill PA**

Figure Title: Site Details Map

Figure No. 2

TDD State: MT TDD: 1105-06

TDD County: Missoula Date: 09/2011

Base Data Source: Bing Maps 2011

Datum/Projection: NAD 1983 UTM Zone 11N

Page Size: 11x17

0 0.25 0.5 0.75 1

Miles

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APPENDIX A

Legal Descriptions of the Land Parcels Constituting the Smurfit-Stone Mill Site

__Legal Descriptions of the Land Parcels Constituting the Smurfit-Stone Mill Site__

- S11, T14 N, R21 W, IN N2 & E2 & IN S2 & RR RIGHT OF WAY IN N2 & SE4
- S11, T14 N, R21 W, NW4 NW4 OF SEC 11
- S02, T14 N, R21 W, PLAT C5/C5-1, PARCEL XXX, IN SE4 SW4 W OF R/W PLAT C5 23.32AC & RR R/W IN SE4 SW4 PLAT C5-1 3.26AC 2-14-21 TOTAL 26.58AC
- S12, T14 N, R21 W, PLAT D',B2,C, PARCEL XXX, IN W2 SW4 & IN NW4 WEST OF MULLAN RD 12-14-21
- S10, T14 N, R21 W, PLAT C, PARCEL XXX, IN NE4 PLAT C 10-14-21 10.73AC
- S14, T14 N, R21 W, PLAT A&A'&B, PARCEL XXX, IN N2 PLAT A, A' & B 192.72AC**RR R/W IN E2 NE4 PLAT C' 3.56AC**IN E2 & E2 SW4 PLAT C 319.53AC 14-14-21 TOTAL 515.63AC
- IN NW4 PLATS A' & B 123.43AC & IN W2 PLA TS C & H 106AC & RR R/W IN W2 PLAT C' 9.51AC & IN SW4 SE4 PLAT I & J 1.79AC TOTAL 240.73AC
- S13, T14 N, R21 W, TRACT A COS 3220 IN SE4 & E2 SW4 E OF CO RD W2 SW4 W OF RR 169.99AC
- IN E2 PLATS E & G 251.08AC & IN S2 PLATS A & C 94.68AC & IN W2 PLAT B 218AC & RR R/W IN NW4 & SE4 PLAT C' 13.09AC 24-14-21 TOTAL 576.85AC
- S13, T14 N, R21 W, PLAT C & B, PARCEL XXX, IN SE4 SW4 PLAT C 13-14-21 & IN E2 NW4 PLAT B 24-14-21 PLANT SITE 69AC
- S19, T14 N, R20 W, PT LOTS 3 & 4 19-14-20
- S23, T14 N, R21 W, PLAT B, PARCEL XXX, IN E2 & E2 NW4 PLAT B 23-14-21 400AC
- W2 & TR A IN W2 NE4 LESS R/W, DITCH & PT SOLD PLATS A & E 395.63AC & RR R/W & TR C IN NE4 LESS PT SOLD PLATS C1 & E3 33.21AC 25-14-21 TOTAL 428.84A

APPENDIX B

PA Report Form 2050-0095

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

EPA Potential Hazardous Waste Site Preliminary Assessment Form

Identification	
MTN000802850	
State	Site Number

CERCLIS Discovery Date: 5/10/2011

1. General Site Information

Name: Smurfit-Stone Mill	Street Address: 14377 Pulp Mill Road				
City: Missoula	State: Montana	Zip Code: 59808-9602	County: Missoula	Co. Code	Cong. Dist: 00
Latitude: 46°57' 50.22" Longitude: 114°12' 02.71"	Approximate Area of Site: 3,200 Acres; ______ Square Feet		Status of Site: ☐ Active ■ Inactive ☐ Not Specified ☐ NA (GW, plume, etc.)		

2. Owner/Operator Information

Owner: M2 Green Redevelopment LLC			Operator: same		
Street Address: 601 East 3rd Street, Suite 302			Street Address:		
City: Alton			City:		
State: IL	Zip Code: 62002-6318	Telephone 618-304-0130	State:	Zip Code:	Telephone

Type of Ownership:
- ■ Private
- ☐ Federal Agency Name ______
- ☐ State
- ☐ Indian
- ☐ County
- ☐ Municipal
- ☐ Not Specified
- ☐ Other ______

How Initially Identified:
- ☐ Citizen Complaint
- ☐ PA Petition
- ■ State/Local Program
- ☐ RCRA, CERCLA Notification
- ☐ Federal Program
- ☐ Incidental
- ☐ Not Specified
- ☐ Other ______

3. Site Evaluator Information

Name of Evaluator: Jeff Miller	Agency/Organization: URS Operating Services- Region 8 START	Date Prepared: July 5, 2011
Street Address: 1099 18th St., Suite 710	City: Denver	Stale: Colorado
Name of EPA or State Agency Contact: Robert Parker, Site Assessment Manager	Street Address: 1595 Wynkoop Street	
City: Denver	State: Colorado	Telephone: 303-312-6664

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation:	CERCLIS Recommendation:	Signature:
☐ Yes ☐ No Date ______	☐ Higher Priority SI ☐ Lower Priority SI ☐ NFRAP ☐ RCRA ☐ Other ______ Date ______	Name (typed): Position:

TDD No. 1105-06
T:\START3\Smurfit Stone Mill PAPA\final PA\Appendix B PA Report Form 2059095.doc

EPA **Potential Hazardous Waste Site Preliminary Assessment Form - Page 2 of 4**	*CERCLIS Number:* **MTN000802850**

5. *General Site Characteristics*

Predominant Land Uses Within One Mile of Site (Check all that apply):

- ☐ Industrial
- ☐ Commercial
- ■ Residential
- ■ Forest/Fields
- ■ Agricultural
- ☐ Mining
- ☐ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility ________
- ☐ Other ________

Site Setting:

- ☐ Urban
- ☐ Suburban
- ■ Rural

Years of Operation:

Beginning Year 1957

Ending Year 2010

☐ Unknown

Type of Site Operations (Check all that apply):

- ■ Manufacturing (must check subcategory)
  - ■ Lumber and Wood Products
  - ☐ Inorganic Chemicals
  - ☐ Plastic and/or Rubber Products
  - ☐ Paints, Varnishes
  - ☐ Industrial Organic Chemicals
  - ☐ Agricultural Chemicals (e.g., pesticides, fertilizers)
  - ☐ Miscellaneous Chemical Products (e.g., adhesives, explosives, ink)
  - ☐ Primary Metals
  - ☐ Metal Coating, Plating, Engraving
  - ☐ Metal Forging, Stamping
  - ☐ Fabricated Structural Metal Products
  - ☐ Electronic Equipment
  - ☐ Other Manufacturing
- ☐ Mining
  - ☐ Metals
  - ☐ Coal
  - ☐ Oil and Gas
  - ☐ Non-metallic Minerals
- ☐ Retail
- ☐ Recycling
- ■ Junk/Salvage Yard
- ■ Municipal Landfill
- ■ Other Landfill
- ☐ DOD
- ☐ DOE
- ☐ DOI
- ☐ Other Federal Facility ________
- ☐ RCRA
  - ☐ Treatment, Storage, or Disposal
  - ☐ Large Quantity Generator
  - ■ Small Quantity Generator
  - ☐ Subtitle D
    - ☐ Municipal
    - ☐ Industrial
  - ☐ "Converter"
  - ☐ "Protective Filer"
  - ☐ "Non- or Late Filer"
- ☐ Not Specified
- ☐ Other ________

Waste Generated:

- ■ On site
- ☐ Off-site
- ☐ On site and off-site

Waste Deposition Authorized By:

- ☐ Present Owner
- ☐ Former Owner
- ■ Present & Former Owner
- ☐ Unauthorized
- ☐ Unknown

Waste Accessible to the Public:

- ■ Yes
- ☐ No (on site)
- ☐ Unknown if off-site disposal is accessible to public.

Distance to Nearest Dwelling, School, or Workplace:

~3,500 Feet from mill facility (but within property boundaries of mill site)

Nearest school: Frenchtown Elementary, 3 miles north

6. *Waste Characteristics Information*

Source Type: (Check all that apply)	Source Waste Quantity: (Include units)	Tier*:
■ Landfill	16 acres	A
■ Surface Impoundment	979 acres	A
☐ Drums		
☐ Tanks and Non-Drum Containers		
☐ Chemical Waste Pile		
■ Scrap Metal or Junk Pile	unknown	A
☐ Tailings Pile		
☐ Trash Pile (open dump)	unknown	A
■ Land Treatment		
■ Contaminated Groundwater Plume (unidentified source)	suspected, but unknown	
■ Contaminated Surface Water/Sediment (unidentified source)	suspected, but unknown	
■ Contaminated Soil	suspected, but unknown	A
☐ Other ________		
☐ No Sources		

* C = Constituent W = Waste stream V = Volume A = Area

General Types of Waste (Check all that apply)

- ■ Metals
- ■ Organics
- ■ Inorganics
- ■ Solvents
- ☐ Paints/Pigments
- ☐ Laboratory/Hospital Waste
- ☐ Radioactive Waste
- ■ Construction/Demolition Waste
- ☐ Pesticides/Herbicides
- ■ Acids/Bases
- ■ Oily Waste
- ■ Municipal Waste
- ☐ Mining Waste
- ☐ Explosives
- ■ Other Asbestos

Physical State of Waste as Deposited (Check all that apply):

- ■ Solid
- ■ Liquid
- ■ Sludge
- ■ Gas
- ☐ Powder

CERCLIS Number: MTN000802850

7. *Groundwater Pathway*

Is Groundwater Used for Drinking Water Within 4 Miles?
- ■ Yes
- ☐ No

Type of Drinking Water Wells Within 4 Miles (Check all that apply):
- ■ Municipal
- ■ Private
- ☐ None

Depth to Shallowest Aquifer: 3 - 20 feet

Karst Terrain/Aquifer Present:
- ☐ Yes
- ■ No

is There a Suspected Release to Groundwater?
- ■ Yes
- ☐ No

Have Primary Target Drinking Water Wells Been Identified?
- ☐ Yes
- ■ No

If yes, Enter Primary Target Population: ______ People

Nearest Designated Wellhead Protection Area:
- ☐ Underlies Site
- ☐ > 0 - 4 Miles
- ☐ None Within 4 Miles

List Secondary TargetPopulation Served by Groundwater Withdrawn From:

0 – 1/4 Mile	140
> ¼ - 1/2 Mile	155
> 1/2 - 1 Mile	384
> 1 - 2 Miles	891
> 2 - 3 Miles	1665
> 3 - 4 Miles	1129
Total Within 4 Miles	4364

Nearest public supply well is approx. 700 feet from the property boundary.

8. *Surface Water Pathway*

Type of Surface Water Draining Site and 15 Miles Downstream (Check all that apply):
- ■ Stream ■ River ■ Pond ☐ Lake
- ☐ Bay ☐ Ocean ☐ Other ______

Shortest Overland Distance From Any Source To Surface Water:
100 Feet
______ Miles

Is There a Suspected Release to Surface Water?
- ■ Yes
- ☐ No

Site is Located in:
- ☐ Annual - 10-year Floodplain
- ■ > 10-year - 100-year Floodplain
- ☐ > 100-year - 500-year Floodplain
- ☐ > 500-year Floodplain

Drinking Water Intakes Located Along the Surface Water Migration Path:
- ☐ Yes
- ■ No

Have Primary Target Drinking Water Intakes Been Identified:
- ☐ Yes
- ■ No

If Yes, Enter Population Served by Primary Target Intakes: ______ People

List All Secondary Target Drinking Water Intakes:

Name	Water Body	Flow (cfs)	Population Served

Total within 15 miles ______

Fisheries Located Along the Surface Water Migration Path:
- ■ Yes
- ☐ No

Have Primary TargetFisheries Been Identified:
- ☐ Yes
- ■ No

List All Secondary Target Fisheries:

Water Body/Fishery Name	Flow (cfs)
Clark Fork River	5,293
O'Keefe Creek	unk

EPA Potential Hazardous Waste Site
Preliminary Assessment Form - Page 4 of 4

CERCLIS Number: MTN000802850

8. *Surface Water Pathway (continued)*

Wetlands Located Along the Surface Water Migration Path:
- ■ Yes
- ☐ No

Have Primary Target Wetlands Been Identified:
- ■ Yes
- ☐ No

List Secondary Target Wetlands:

Water Body	Flow (cfs)	Frontage Miles
Clark Fork	5,293	>8*

*could be significatly higher if emergent hydrophytes are present in unconsolidated shore riverine wetlands

Other Sensitive Environments Located Along the Surface Water Migration Path:
- ☐ Yes
- ■ No

Have Primary Target Sensitive Environments Been Identified:
- ☐ Yes
- ■ No

List Secondary Target Sensitive Environments:

Water Body	Flow (cfs)	Sensitive Environment Type

9. *Soil Exposure Pathway*

Are People Occupying Residences or Attending School or Daycare On or Within 200 Feet of Areas of Known or Suspected Contamination:
- ☐ Yes
- ■ No

If Yes, Enter Total Resident Population:

_________ People

Number of Workers On Site:
- ☐ None
- ■ 1 - 100
- ☐ 101 - 1,000
- ☐ >1,000

Have Terrestrial Sensitive Environments Been Identified On or Within 200 Feet of Areas of Known or Suspected Contamination?
- ☐ Yes
- ■ No

If Yes, List Each Terrestrial Sensitive Environment:

10. *Air Pathway*

Is There a Suspected Release to Air:
- ☐ Yes
- ■ No

Enter Total Population On or Within:

On Site	0
0 - 3 Mile	241
>3 - 2 Mile	218
>2 Mile - 1 Mile	85
>1 - 2 Miles	838
>2 - 3 Miles	L836
>3 - 4 Miles	1,030
Total Within 4 Miles	4,248

Wetlands Located Within 4 Miles of the Site:
- ■ Yes
- ☐ No

Other Sensitive Environments Located Within 4 Miles of the Site:
- ☐ Yes
- ■ No

List All Sensitive Environments Within 2 Miles of the Site:

Distance	Sensitive Environment Type/Wetlands Area (acres)
On Site	wetlands (986 acres within mill boundary in ponds)
0 - 1 Mile	wetlands (605 acres)
> 1 - 2 Mile	wetlands (420 acres)

APPENDIX C

CERCLA Eligibility Worksheet

CERCLA Eligibility Worksheet

Site Name Smurfit Stone Mill

City Missoula State Montana

EPA ID Number MTN000802850

Note: The site is automatically CERCLA eligible if it is a federally owned or operated RCRA site.

I. CERCLA Eligibility

Did the facility cease operations prior to November 19, 1980? NO

If YES, then STOP. The facility is probably a CERCLA site.
If NO, continue to part II

II. RCRA Deferral Factors

Did the facility file a RCRA Part A application? inactive

If YES:
1. Does the facility currently have interim status?
2. Did the facility withdraw its Part A application?
3. Is the facility a known or possible protective filer? (filed in error)
4. Does the facility have a RCRA operating or post closure permit?
5. Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the state? (facility did not know it needed to file under RCRA)

Type of facility:
Generator_____ Transporter____ Recycler______
TSD (Treatment/Storage/Disposal)_____

If all answers to questions 1, 2, and 3 are NO, STOP. The facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP. The facility is a CERCLA eligible site.

If answer to #2 and #3 are NO and any other answer is YES, site is RCRA, continue to part III.

III. RCRA Sites Eligible for the NPL

Has the facility owner filed for bankruptcy under federal or state laws? YES

Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?

Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980? ____________________

IV. Exempted substances:

Does the release involve hazardous substances other than petroleum? YES

V. Other programs: The site may never reach the NPL or be a candidate for removal. We need to be able to refer it to any other programs in EPA or state agencies which may have jurisdiction, and thus be able to effect a cleanup. Responses should summarize available information pertaining to the question. Include information in existing files in these programs as part of the PA. Answer all that apply.

Is there an owner or operator?

NPDES-CWA: Is there a discharge water containing pollutants with surface water through a point source (pipe, ditch, channel, conduit, etc.)?

CWA (404): Have fill or dredged material been deposited in a wetland or on the banks of a stream? Is there evidence of heavy equipment operating in ponds, streams or wetlands?

UIC-SDWA: Are fluids being disposed of to the subsurface through a well, cesspool, septic system, pit, etc.?

TSCA: Is it suspected that there are PCB's on the site which came from a source with greater than 50 ppm PCB's such as oil from electrical transformers or capacitors?

FIFRA: Is there a suspected release of pesticides from a pesticide storage site? Are there pesticide containers on site?

RCRA (D): Is there an owner or operator who is obligated to manage solid waste storage or disposal units under state solid waste or groundwater protection regulations?

UST: Is it suspected that there is a leaking underground storage tank containing a product which is a hazardous substance or petroleum?

APPENDIX D

Photolog

Photo 1
Aerial shot of Clark Fork River and mill property, mill facility on far right, looking north.
06/10/2011

Photo 2
Aerial shot of mill with sludge ponds in middle ground, looking east.
06/10/2011

Photo 3
Aerial shot of sludge ponds 3 (bottom middle) 5 (top left) and 4 (top right), with effluent clarifier on far right.
06/10/2011

Photo 4
Aerated stabilization basins I and II (center) III (middle right) and North Polishing Pond (bottom right), looking west.
06/10/2011

Photo 5
Aerated stabilization basins (I is white, draining into II), Pond 8 (emergency Spill Pond) on far left.
06/10/2011

Photo 6
Western edge of Pond 13 (treated wastewater storage) and Clark Fork River, looking east.
06/10/2011

Photo 7
Landfarm area, looking southeast.
06/22/11

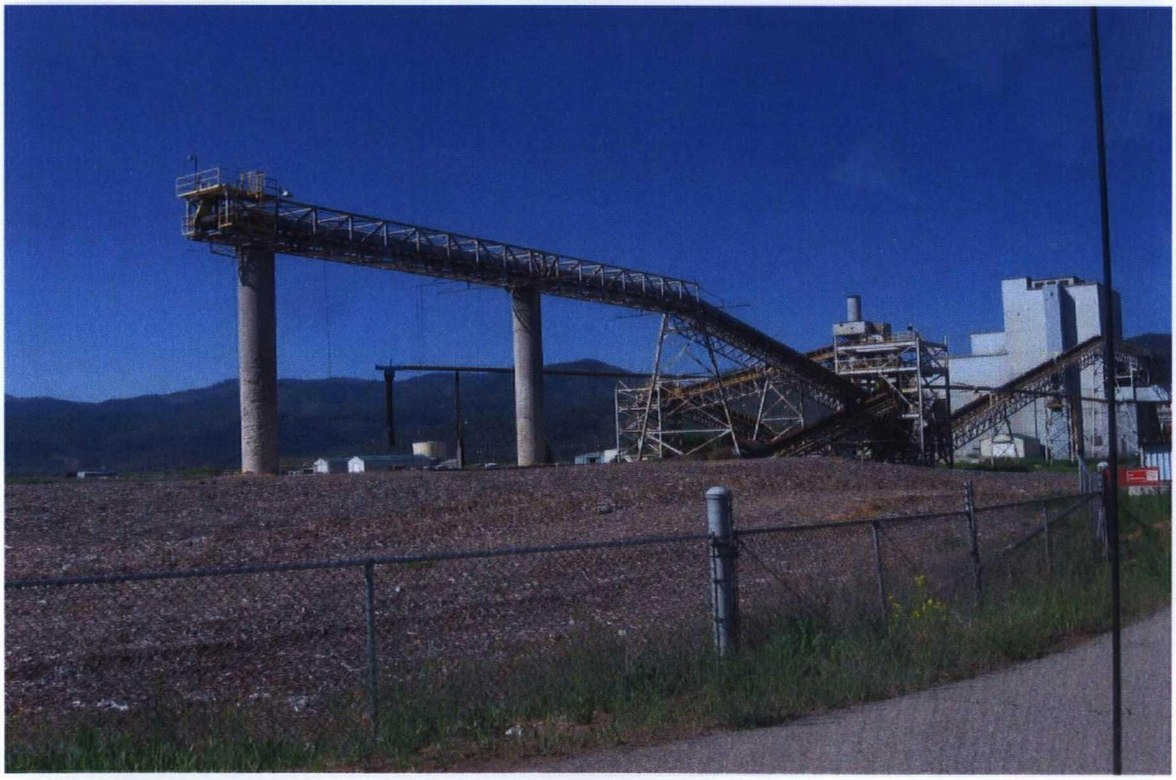


Photo 8
Hog fuel area, looking southwest.
06/22/11

Photo 9
Hog fuel unloading area (blue frame), looking northeast.
06/22/11

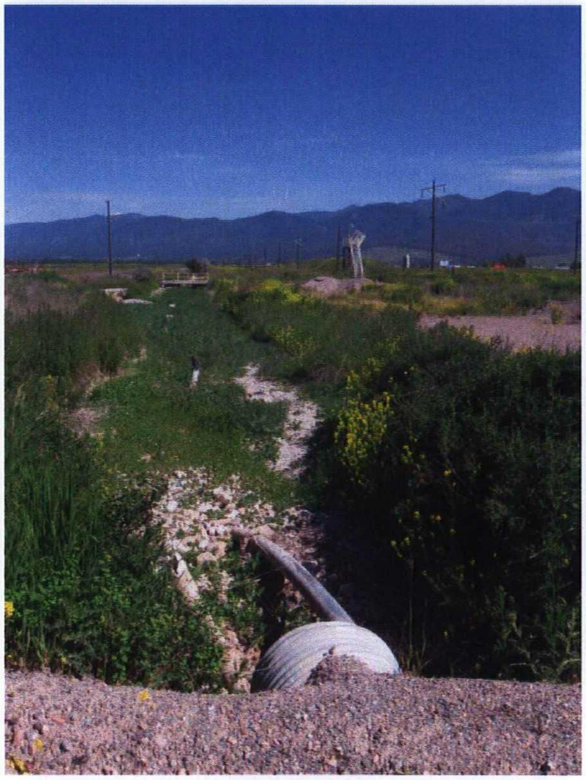


Photo 10
Cooling water ditch (non-contact process water). Black pipe is return flow from color removal facility to mill. Looking northwest.
06/22/11

Photo 11
Monitoring well SMW7 and wetlands along north of property, looking northwest.
06/22/11

Photo 12
Cooling water ditch outfall (outfall #4) and monitoring station,
looking west toward Clark Fork River.
06/22/11

Photo 13
Outfall #3, Clark Fork River in background, looking west.
06/22/11

Photo 14
Clark Fork River along west side of mill property, looking south (upstream).
06/22/11

Photo 15
Outfall #1, Clark Fork River in background, looking west.
06/22/11

Photo 16
O'Keefe Creek running through property south of Pond 17, looking northeast.
06/22/11

Photo 17
Pond 17 (sludge and fly ash), looking north towards mill.
06/22/11

Photo 18
Pond 3 (sludge) covered with 10-12" of wood chips for dust suppression,
looking northeast towards mill.
06/22/11

Photo 19
Pond 5 (sludge), looking northwest.
06/22/11

Photo 20
Original facility landfill (slightly humped area in bottom center of photo),
aka Pond A, looking northeast.
06/22/11

Photo 21
Pond 4, oldest sludge pond (received sludge the longest), pale color due to sun-bleaching of wood fiber on surface, looking west.
06/22/11

Photo 22
'Bottom ash' pile, forms north berm of Pond 4, looking west.
06/22/11

Photo 23
Asbestos waste disposal site (Area 'F') sign, north of Pond 4, looking northwest.
06/22/11

Photo 24
Pond 8 (Emergency spill pond), looking west.
06/22/11

Photo 25
Pond 8 (Emergency spill pond), looking northwest.
06/22/11

Photo 26
Treated Wastewater Aeration basin II, looking southeast back towards the mill.
06/22/11

Photo 27
Pond 8 (Emergency spill pond) showing breach in northwest corner, looking west.
06/22/11

Photo 28
Pond 9 (treated wastewater storage) showing regrowth of vegetation, looking west.
06/22/11

Photo 29
'Bone yard' (disused equipment storage area), looking west.
06/22/11

Photo 30
Pond 8 (Emergency spill pond), looking northwest.
06/22/11

Photo 31
Pond 8 (Emergency spill pond) 'dry cell' (area kept in reserve until needed), looking northwest.
06/22/11

Photo 32
Overflow ditch from effluent clarifier, with bottom ash berm of Pond 4, looking southeast.
06/22/11

Photo 33
Old Cardboard Container (OCC) facility, looking north.
06/22/11

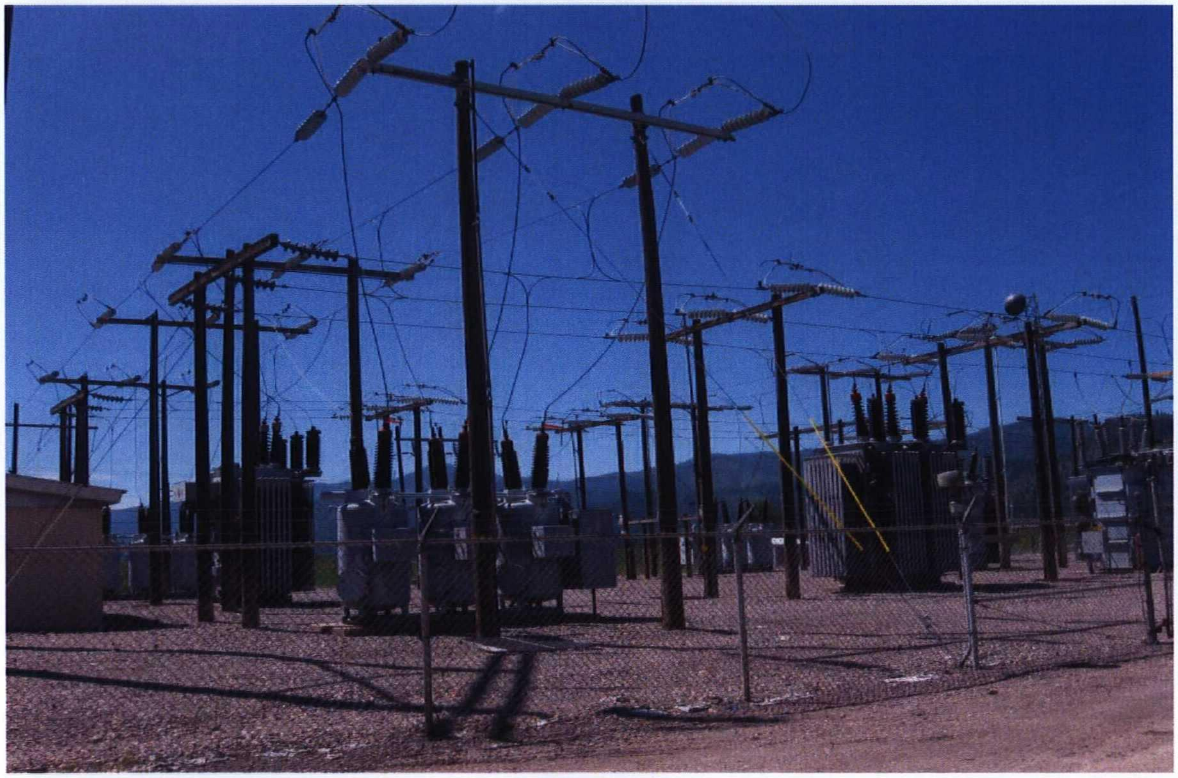


Photo 34
Northwest Energy substation, looking south.
06/22/11

Photo 35
Chemical unloading area (note train tracks), (chlorine plant is behind this area), looking north.
06/22/11

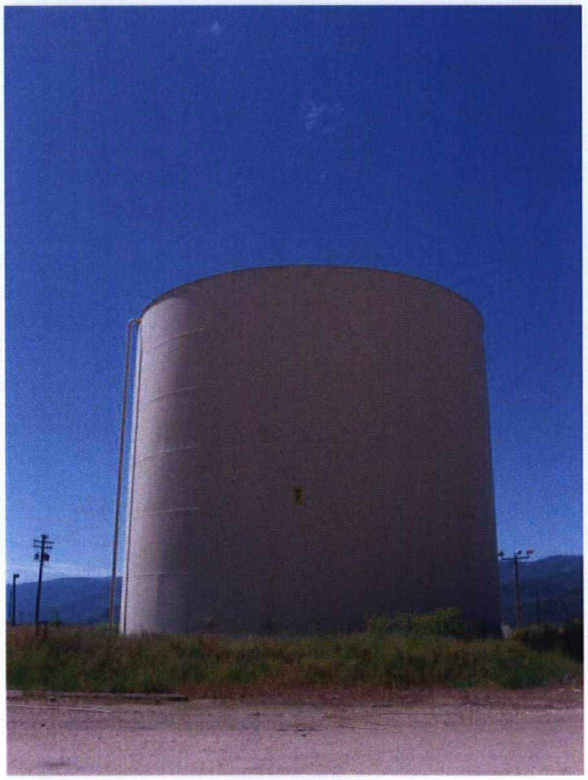


Photo 36
One million gallon #6 fuel oil AST (abandoned pre-1989), looking south.
06/22/11

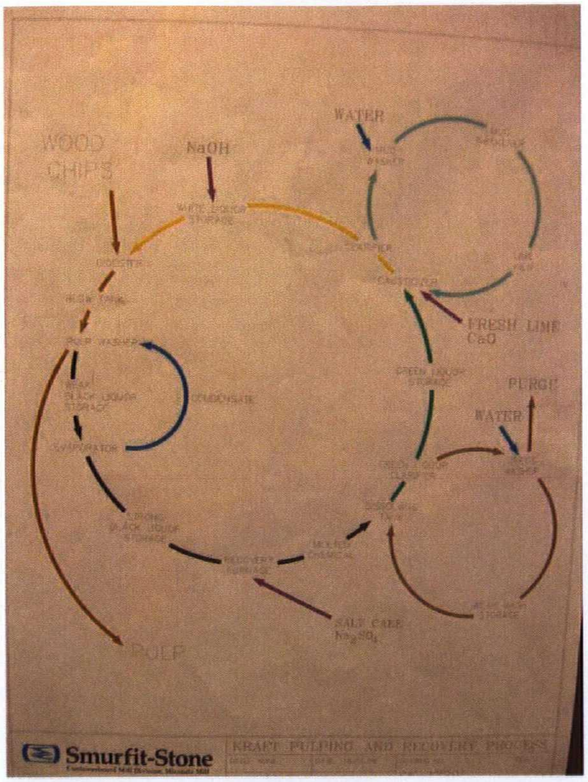


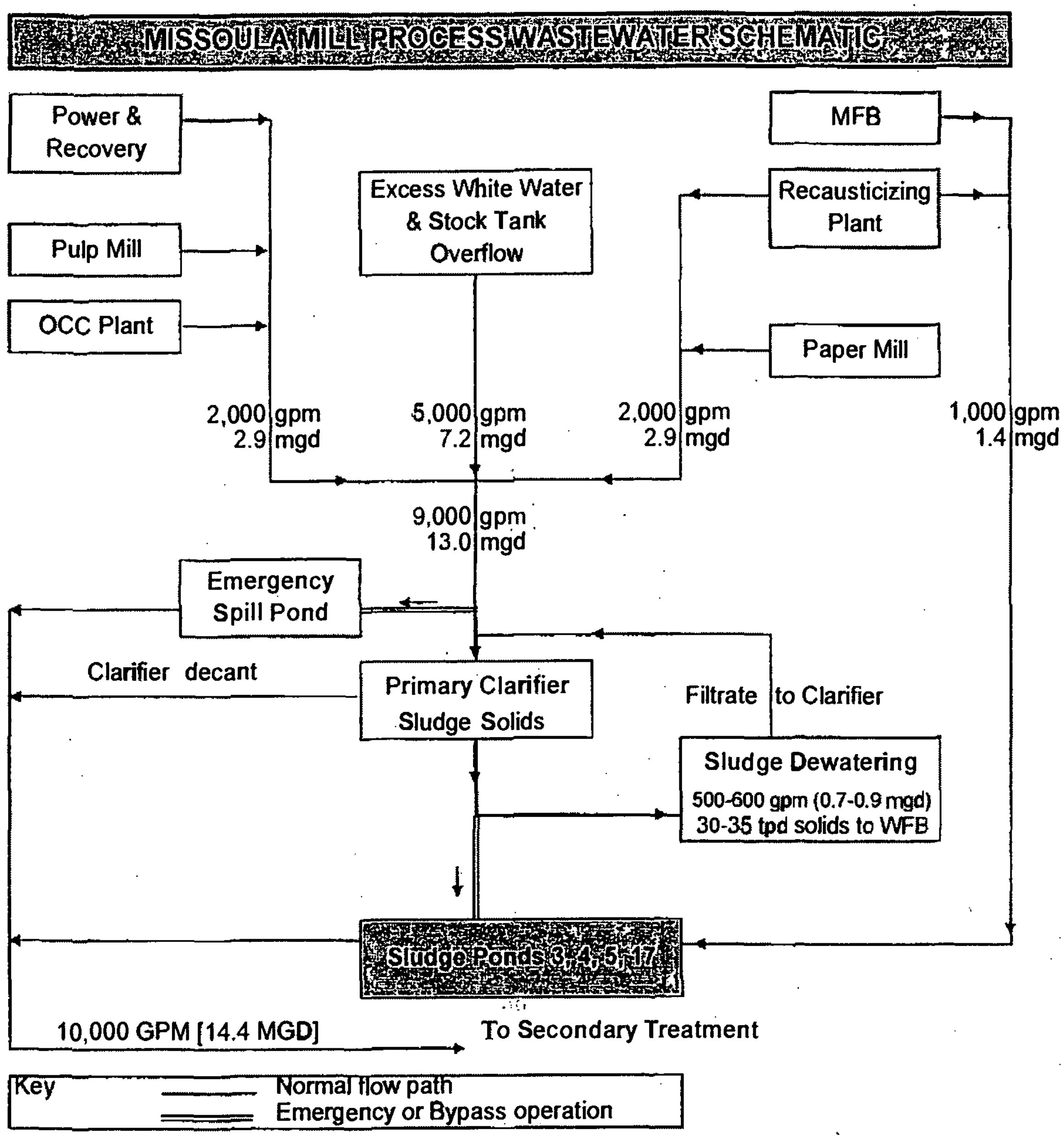
Photo 37
Smurfit-Stone kraft pulping and recovery process diagram, dated 10/11/1996.
06/22/11

Photo 38
View of front of facility, looking southwest.
06/22/11

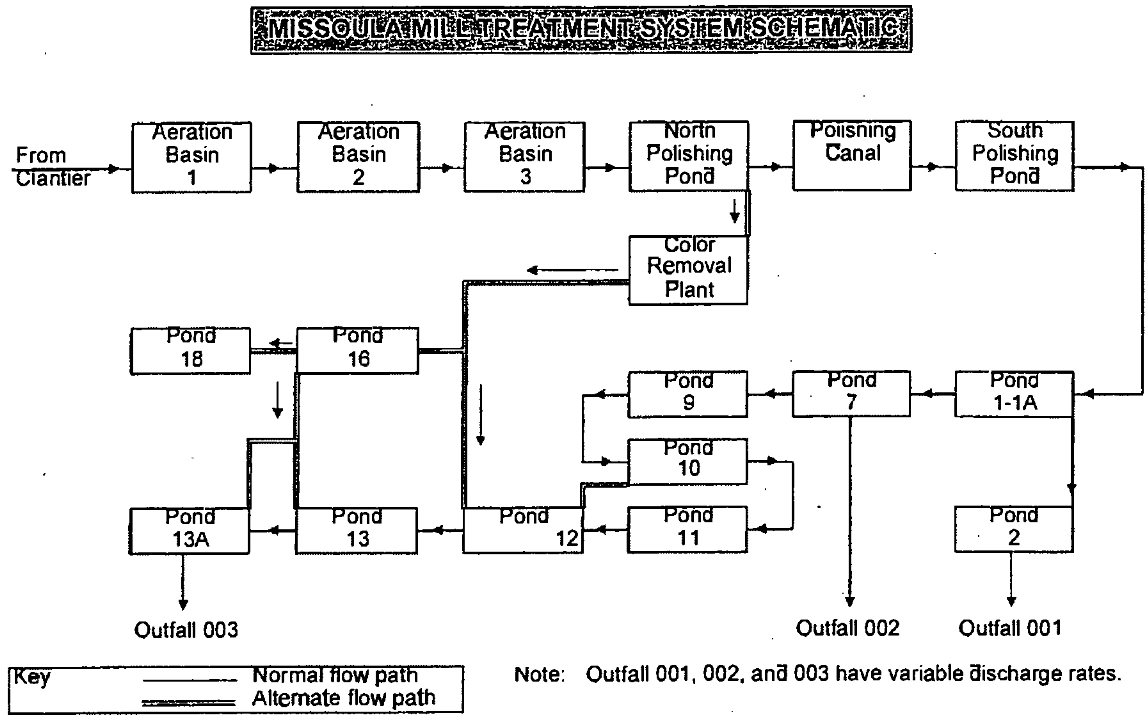
Photo 39
View of woodchip staging area, looking northwest.
06/22/11

APPENDIX E

Wastewater Flow Diagrams



Source: Smurfit-Stone Container Enterprises, Inc. Missoula Mill. 2004. Application for renewal of Wastewater Discharge Permit No. MT-0000035. November 2004.



Source: Smurfit-Stone Container Enterprises, Inc. Missoula Mill. 2004. Application for renewal of Wastewater Discharge Permit No. MT-0000035. November 2004.

APPENDIX F

National Wetlands Inventory Map for the TDL

U.S. Fish and Wildlife Service

National Wetlands Inventory

TDL-Smurfit-Stone

Jul 6, 2011

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks: